

SUCCESS

as a scavenger

ANDY MARTI, MARTIN ENGINEERING, US,
EXPLAINS HOW A SCAVENGER
CONVEYOR IMPROVES THE FUNCTION
OF CONVEYOR SYSTEMS AND REDUCES
THE NEED FOR, AND THE SAFETY
RISKS INHERENT IN, CLEANING AND
MAINTENANCE BY MINE PERSONNEL.

Belt cleaners are installed to remove material that sticks to a conveyor past the nominal discharge point. The cleaners are generally installed at the discharge, usually at the head pulley, because this position allows the fines and slime removed from the belt to be returned to the main material stream. Typically, dual cleaners are installed: a primary or pre-cleaner installed on the face of the head pulley, with its cleaning edge

just below the material trajectory; and a secondary cleaner installed near the bottom of the head pulley.

Sometimes, even dual cleaners are not enough and so additional cleaners are added. In underground mine applications where coal is wet and sticky, additional cleaners are often installed to achieve the desired level of cleanliness. Many mines install a series of cleaners – up to six or eight cleaning edges – to provide satisfactory cleaning.

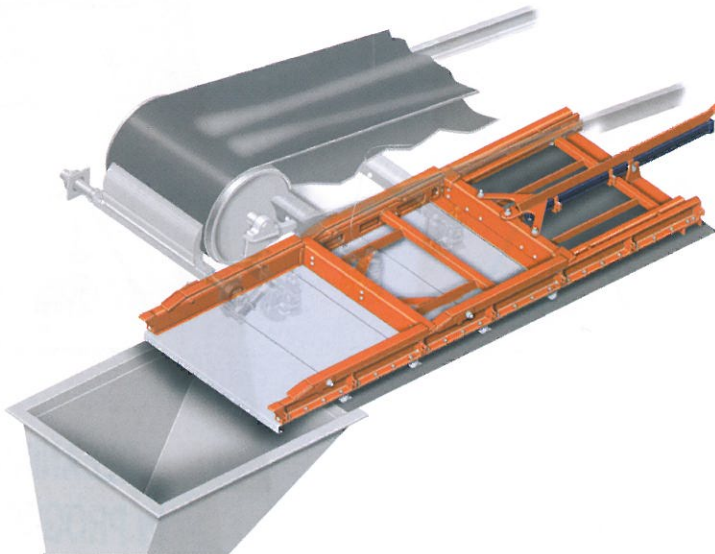




Martin Engineering's new Carryback Capture System is a modular scavenger conveyor that returns fugitive material to the main cargo stream in challenging underground applications.



The hydraulic ram of the Carryback Capture System moves a plough across the collection tray to return material to the main cargo stream.



A scavenger conveyor, such as the Carryback Capture System, is installed below the main conveyor to push material removed from the belt by tertiary (off-pulley) belt cleaners back into the main material flow.

However, because many conveyors (especially those underground) feature limited spacing due to small head pulleys, small chutes and nearby walls, there is insufficient room at the discharge pulley to install all the cleaners required. So the additional cleaning systems, termed tertiary cleaners, are installed at some point further along the belt return.

These additional cleaners can work well when properly installed and maintained. This tertiary location provides an additional benefit: as they are further away from the pulley and the chutework, these cleaners may be easier to install, inspect and maintain.

However, with this good news comes some bad. The downside of the off-pulley tertiary cleaner location is that the material removed from the belt cannot easily be returned to the cargo. The cleaners are frequently installed too far away from the head chute for the fines and slime to drop into the main material stream.

The material these tertiary cleaners remove from the belt typically falls to the ground under the cleaner. This material builds up into a pile where it can interfere with conveyor components, including idlers and the cleaners themselves. The accumulation can bury these components in a hardening encrustation that interferes with the operation and service life of components. In the case of coal, this also creates a fire hazard. These accumulations require clean up labour and expense, and increase the risk of injury from working around the moving belt for the miners sent into the area for maintenance chores.

The need for a scavenger

To combat these problems, scavenger conveyors are installed. A scavenger is a small conveyor installed underneath the longer 'mainline' belt conveyor. The scavenger collects carryback removed by the tertiary cleaning system and moves it back to the material stream or where it can otherwise be more easily handled.

Scavenger conveyors are most commonly applied in underground applications, where there is limited room above and below the conveyor, preventing the installation of a dribble chute with sufficient angle that the sticky fines will move – through gravity alone, or with an assist from vibration – to the main cargo stream. The distance the scavenger conveyor is required to move the material might be 4 ft, 12 ft, 20 ft (1.2 m, 3.7 m, 6 m) or more, depending on the circumstances of the head pulley.

In preparation and power plants, many conveyor head chutes are undersized, requiring secondary cleaners be placed outside the chute and beyond the reach of dribble chutes. Here, a shorter scavenger might serve.

As these plants respond to environmental, regulatory and safety pressures to improve coal conveying to release less dust, as seen in the US's ongoing OSHA Combustible Dust National Emphasis Program, more tertiary cleaning systems will be installed. This, in turn, will require the addition of scavenger conveyors to return material cleaned from the belt to the material stream.

A scavenger conveyor typically features a mechanical plough or scraper, or some low friction surface that is vibrated or otherwise actuated to move the material. As they are usually nearly horizontal in path, (meaning the material will not move due to gravity), scavenger conveyors require some mechanism to move the material. This system – an electric motor, a hydraulic pump, a pneumatic vibrator – is independent of the drive system of the main conveyor, although it may

be controlled by the same control circuit.

Of course, the rugged nature of the environment and the condition of the material – wet fines and slop – mean that a scavenger conveyor must be engineered to withstand worst case conditions. The more foolproof any system installed in these rugged conditions is, and the lower maintenance requirements and simpler-to-service its components are, the more successful will be the application.

A new system

Martin Engineering is introducing a new scavenger conveyor system: the Martin® Carryback Capture System. This patented system is engineered for harsh conditions in underground mining and other coal- (and ore-) handling applications.

The Martin scavenger conveyor uses an electrically-driven hydraulic cylinder to push a steel cleaning blade – or in a longer scavenger, a series of blades – across the scavenger's collecting pan, pushing the slop and fines in the trough toward the conveyor discharge. On the return stroke, the ploughs ride up onto tracks to be pulled back to the starting position without dragging material in the wrong direction. The cleaning cycle of each unit is adjusted to match the belt speed of the main conveyor.

This patented scavenger conveyor is modular to allow simple (and economical) movement and installation at remote and confined locations where these cleaning systems typically need to be installed. It is designed in bolt-together 4 ft (1.2 m) sections, with one plough cleaning blade in each section.

The system is modular so it can be easily constructed in lengths from 8 – 24 ft (2.4 – 7.3 m); longer units are available upon request. Units are available to match the main belt width, from 36 – 72 in. (900 – 1800 mm).

The Carryback Capture System scavenger conveyor stands only 13 in. (330 mm) high, allowing it to

fit into tight spaces under conveyors or between systems in low overhead conditions.

The moving ploughs are powered by a 3 hp., three-phase, 480 VAC hydraulic power pack.

The collection deck is carbon steel, with stainless steel available as an option. An optional belt motion sensor allows control of the scavenger conveyor to be automated so it runs whenever the main conveyor is in operation.

The system has been applied on mainline and longwall panel belts in coal mines in both the eastern and western US, where it has been quickly accepted for its demonstrated durability and low maintenance requirements.

Benefits in cleaning, maintenance and safety

Scavenger conveyors provide the following benefits:

- They return material to the cargo and so prevent encapsulation of the cleaners and other components, maintaining the efficiency of belt cleaning systems.
- They reduce the need for maintenance and clean up around the belt conveyor, helping to reduce the costs for replacement components and labour expenses.
- They improve safety, as there will be less need for miners to work around a moving belt, performing the clean up and maintenance chores.

Just as belt cleaners remove carryback from, and so preserve the life of, the belt and components, scavenger conveyors are installed to preserve the life and efficiency of belt cleaners. They improve cleaning efficiency and conveyor productivity, without raising maintenance costs or safety risks.

Rugged, effective scavenger conveyors like the Carryback Capture System will improve conveyor efficiency, preserve component life and improve miner safety in underground operations. 