

EFFICIENT PLANT

ACHIEVING OPERATIONAL PROFITABILITY

Filling the Skills Gap

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New conveyor loading zone cleans up work environment and eliminates shutdowns.

Keep Fugitive Material In Its Place

OPERATORS NEED ONLY take a broad look at the expense that fugitive material contributes to a conveyor system to realize the full cost that accompanies inefficient transfer-point designs. Problems such as improper belt support, badly sealed chutes, damaged idlers, and uneven cargo distribution can all result in spillage and belt mistracking, contributing to increased costs for maintenance and cleanup and the potential for injury and compliance issues. Well-designed conveyor loading zones keep walkways clear from spillage, minimize dust emissions, and allow hazard-free inspections and maintenance.

When tons of bulk material hit a moving belt, three things happen: fines scatter in random directions, cargo shifts, and dust becomes

Left. The reconfigured conveyor controls emissions for improved safety and easier maintenance.

Right. Dust accumulation on rolling components can cause abrasive damage and premature failure.

airborne. The impact can create turbulent air pressure inside the chute that seeks to escape from any gap it can find, carrying dust and fines with it. A properly designed enclosure can manage bulk solids, allow cargo to settle in the center of the belt, and contain most of the dust inside a settling zone enclosure.

SPILLAGE COST

If left uncontained and allowed to spread, fugitive material in the form of dust and fine-particle spillage increases labor costs for cleanup, fouls equipment, potentially encapsulates the belt, and poses a serious safety hazard. A dirty and dusty environment can also discourage workers from doing regular maintenance on the problem area and may affect morale.

Since trips and falls are regularly among the most common workplace accidents, OSHA inspectors are constantly on the lookout for those hazards. In severe cases, spillage blocks access to the system and exacerbates the hazards of working near a moving belt.

Dust levels are also strictly regulated by OSHA, and permit violations can be accompanied by fines and potential downtime. In industries known for dust generation, workers wear personal dust monitors to measure particulate levels throughout their shifts. Working within proximity of poorly designed loading zones can cause monitored levels of PM10 (particulate material of less than 10 microns) to exceed allowable limits.

SEALED-CHUTE COMPOSITION

A well-designed loading zone typically consists of a combination of components. These include:

- ▶ An enclosed transfer chute long enough to give dust and fines time to settle.
- ▶ A heavy-duty belt support system that absorbs impact, protects the belt, and can handle rapidly shifting heavy material.
- ▶ Closely spaced idlers to avoid sags in the belt that allow gaps where fines can escape and ease material disruption from bouncing.
- ▶ Externally adjustable or self-adjusting skirting that contains fine particles and adapts to fluctuations in the belt plane.
- ▶ Easily serviced wear liners that can be changed from outside the chute without the use of a blowtorch.
- ▶ Dust curtains set strategically throughout the enclosure to control airflow and help settle dust.



- ▶ Dust bags or mounted air cleaners to collect tiny, highly active dust particles.
- ▶ A sealed tail box to protect the tail pulley from the backflow of fines, dust, and spillage.
- ▶ Exit curtains to prevent fugitive dust from escaping from

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Raw bulk material drops onto a moving conveyor belt, creating dust and spillage.

the end of the chute. Dust and spillage are top concerns for many safety professionals. Field tests have shown that enlarged skirtboards and engineered settling zones promote dust settling and reduce fugitive material.

CASE STUDY

A mine in north-central Mexico was experiencing excessive spillage and dust emissions at the loading zone of its tower-mounted conveyor transporting raw gold, silver, zinc oxide, copper, lead, molybdenum, and sulfides. Despite installing various transfer and loading-chute components from an outside supplier, workers found that dust filled the tower and chunks of 2-to-3-in.-diameter raw material spilled from the transfer chute onto the stairs, partially blocking access to the area and creating a potential workplace hazard. Twice a month, operations had to be disrupted for 12 to 24 hr. so that a team could clean spillage and return it to the cargo flow. Cleanup and downtime raised the cost of operation and lowered efficiency.

Technicians from Martin Engineering Mexico, part of Martin Engineering, Neponset, IL (martin-eng.com), were contacted and, after a thorough inspection, designed a plan based on the principles of Production Done Safely. It addressed all aspects of the bulk-handling process for properly guiding the cargo through the transfer chute.

Martin impact cradles were installed to center the material and promote belt health, while slider cradles improved performance and safety by sliding out for external maintenance. The project also included skirt-ing and dust bags to contain emissions and spillage throughout the settling zone. Strategically placed belt trackers align the belt along the entire path. Heavy-duty primary and secondary cleaners slide in and out for service and were installed at the discharge zone to reduce carryback and promote safer blade replacement.

The entire system was designed with safety features and ease of maintenance in mind. Each of the components work together to deliver a comprehensive bulk-handling solution that promotes efficiency and a safer workplace.

Following installation, fugitive material was significantly reduced and spillage no longer blocked access to the area. The air around the transfer point and throughout the tower was much clearer. “We no longer need scheduled shutdowns just for cleaning,” said an operations manager. The customer cited the engineering team’s thorough understanding of the mine’s needs and the quality of the equipment.

With some fairly simple calculations, cost-minded managers can see the negative impact of labor costs for cleanup and maintenance on the bottom line. Combined with the expense of fouled equipment replacement, potential OSHA violations, and unscheduled downtime, the expense of a chute redesign can become an essential capital expense.

Using effective technologies, even poorly performing conveyors need not be replaced, but merely modified and reconfigured by installing modern equipment. These improvements help operations improve efficiency, reduce risk, and contribute to regulatory compliance. **EP**

For more information, visit martin-eng.com.