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Safety Sealed:

How Conveyor Skirting Prevents Hazardous Dust and Spillage

By DAVE MUELLER

Although skirtboard sealing systems have been around for decades and are standard for any efficient conveying system, that doesn't necessarily mean the designs currently in use by most bulk handlers are well engineered, function adequately and promote a safe working environment. Maintaining a safe workplace requires installing equipment that consistently keeps walkways clear from fugitive material, prevents dust emissions and allows maintenance to be performed safely without hazards such as confined space entry.

The importance of skirting should be self-evident. Most bulk handling operations have a conveyor belt with vertical loading or a transfer chute, often containing little more than a rock box to slow material on its descent. When tons of bulk material hit a moving belt, three things happen: fines scatter in a random direction, cargo shifts as it settles

to the center of the belt and dust becomes airborne. A properly designed enclosure can manage bulk solids but cannot contain all of the dust. Inside a settling zone enclosure, the impact can create turbulent air that seeks the easiest escape from any gap it can find, carrying dust and fines with it. These gaps generally appear on the sides of the enclosure between the chute wall and the belt. Skirting systems address the challenge of containing fugitive dust.

Belt Sealing Regulations and Hazards

The Occupational Safety & Health Administration (OSHA) in the United States, as well as other government regulatory organizations around the world, put workplace safety rules in place to protect workers from the hazards of dust and spillage. OSHA 1917.48(h) specifically states, "The area around conveyor loading and unloading

points shall be kept clear of obstructions during conveyor operations." Airborne dust can also be considered a visual obstruction.

Extensive studies of both underground mines and open-air bulk handling operations indicate long-term exposure to airborne dust can cause chronic lung diseases. Invisible fugitive particulates small enough to penetrate deep into the lungs can also travel long distances and may be able to leave the site line, another violation in most regulated environments.

Even if workers are required to wear respirators in dust-filled locations, outside of the immediate area where it may seem safe to remove the equipment, exposure is still possible. Containing fugitive dust within the conveyor enclosure not only protects workers, it prevents gritty particulates from getting into rolling components such as idlers and pulleys, which can cause undue wear and potential seizure, as well as dangerous frictional heating.

As for spillage, OSHA closely monitors the number of conveyor-related injuries that occur during routine maintenance and cleanup, concluding that controlling fugitive material should be viewed as one of the primary elements in reducing hazards and pre-

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venting injuries. Spillage can block walkways, inhibit inspection and maintenance, create a tripping hazard and require regular cleanup that diverts vital man-hours. And while cleaning under or around a moving belt is considered to be a serious hazard, it remains a common practice.

In addition, material piling in the loading area can quickly encapsulate the belt and tail pulley. Spillage of just 4 grams (0.14 oz) per hour will result in an accumulation of 680 g (1.5 lbs) by the end of a week. If the rate of escape is 4.5 g per minute, the buildup will approach ≈ 45 kg (100 lbs) per week, exceeding 1.8 mtpy (2 tpy). With spillage of just one shovelful per hour, the total could reach 227 kg (500 lbs) of material every day. That kind of volume can cause equipment breakdowns, foul the pulley face and promote belt alignment issues.

Installation and service of skirtboard systems can also be hazardous, with some designs welded to the inside of the chute structure, involving confined space entry with a grinder or blow torch to perform maintenance, repair or replacement. According to OSHA, “permit-requiring confined spaces” allow only an “authorized entrant” to perform the work inside the chute, assisted

by an “attendant” monitoring the safety of the entrant from the outside and supporting the removal of material from the chute. In some cases, a supervisor must also be present to oversee the project. Explosive dust is another serious hazard, easily ignited by sparks from metal tools and must be thoroughly washed from chute walls to avoid potential disaster. Properly sealing the chute using modern skirting designs can help avoid equipment breakdowns, improve workplace safety and prevent excessive downtime due to dust and spillage.

Skirting Best Practices

The skirt should be considered a safety device first and foremost, protecting the work environment from fugitive dust and spillage and therefore reducing the time exposed to hazards while cleaning, with the added benefit of increased efficiency.

Since skirts are wear parts, it is important that they are easily installed, adjusted, maintained and replaced to avoid dust and spillage, mitigate downtime, improve workplace safety and reduce the cost of operation.

For most bulk handling operations, dust and spillage at the loading zone is an ongoing maintenance and cleanup issue. Not only

can fugitive material become a safety, regulatory compliance and air quality issue, but equipment life is also affected. Abrasive dust and fines can foul mechanical components, requiring premature replacement. Along with increased labor for cleanup and maintenance, unscheduled downtime can raise the cost of operation.

By installing modern skirtboards that prevent fugitive material from leaving the loading chute, operators can reduce worker exposure to hazards, minimize labor for maintenance and cleanup, improve equipment and belt life and achieve better compliance. The savings on labor and operating costs alone provide a sound return on investment, but the improvement to workplace safety should be the only motivation needed.

FSM
Dave Mueller is a long-time employee of Martin Engineering, having started his career with the company in 1986 and has since established himself as an expert in conveyor accessories. A graduate of Penn Foster College with a B.A. in Business Management, Dave has 10 years in Research & Development on conveyor products, 26 years as Conveyor Product Manager, is a prolific contributor of articles, and has several patents.

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