White Paper

Conveyor Dust and Spillage: The Importance of Skirtboard Sealing Systems

Edited by on 19. Oct. 2023

The global leader in belt conveyor accessories, Martin Engineering, designs products around safety to promote an efficient and clean working environment and part of that is manufacturing properly sealed conveyor chutes for bulk handling. The latest innovations the company has devised are the ApronSeal™ Double Skirting for extra sealing in high dust environments and a self-adjusting skirting system with limited maintenance. This article explains some of the issues older designs experience, how a sealed environment improves workplace safety and how skirting can reduce labor costs for cleanup, in turn, lowering the cost of operation.

ApronSeal™ Double Skirting offers a dual seal and can be flipped for extended equipment life. (Pictures: ©Martin Engineering)

When tons of transferred bulk material hits a moving belt, three things happen: fines scatter, cargo shifts as it settles and dust becomes airborne. 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 and spillage.

What is a Skirtboard Sealing System?

Usually made from natural or SBR rubber (or specialty formulations for specific applications such as underground mining, food, etc.), the skirting extends down the entire length of the transition enclosure and is generally tapered at the bottom to match the trough angle of the belt. It is intended to maintain a seal on the enclosure and help trap any fine particles and dust that is not contained by the wear liners and chute wall.

Skirting Issues

As the skirt edge loses its seal, gaps are created, which allow material to become entrapped in a “pinch point.” This causes abrasion that gouges or chafes the surface of the belt down its entire length.

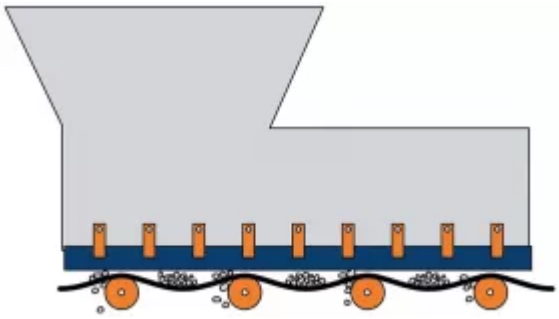

Fig. 1: Gaps, spillage and entrapment are not always apparent to the naked eye.

Some of the major issues from entrapment include s*calloping,* when wedged material causes excessive wear, and *grooves,* when debris collects under the skirt causing friction damage. Regardless of the belt tension, *belt sag* will create a space for fugitive dust to escape or for material to become entrapped. [Fig.1] This is avoided by retrofitting a skirt sealing system with impact cradles or edge support rather than rollers in the loading zone.

Proper Enclosure Configuration

Wear liners are typically welded to the inside of the chute wall with the skirtboard attached on the outside using an adjustable clamp system. However, the internal design [Fig.2] can allow some material buildup in the gap between the wear liner and the skirtboard, depending on the size of the aggregate.

External wear liner and skirting configurations place both pieces of equipment outside the chute wall. [Fig.3] Placing the skirt seal and wear liner outside of the chute makes it easier for workers to perform adjustments safely. The result is a better seal on the belt and less material entrapment.

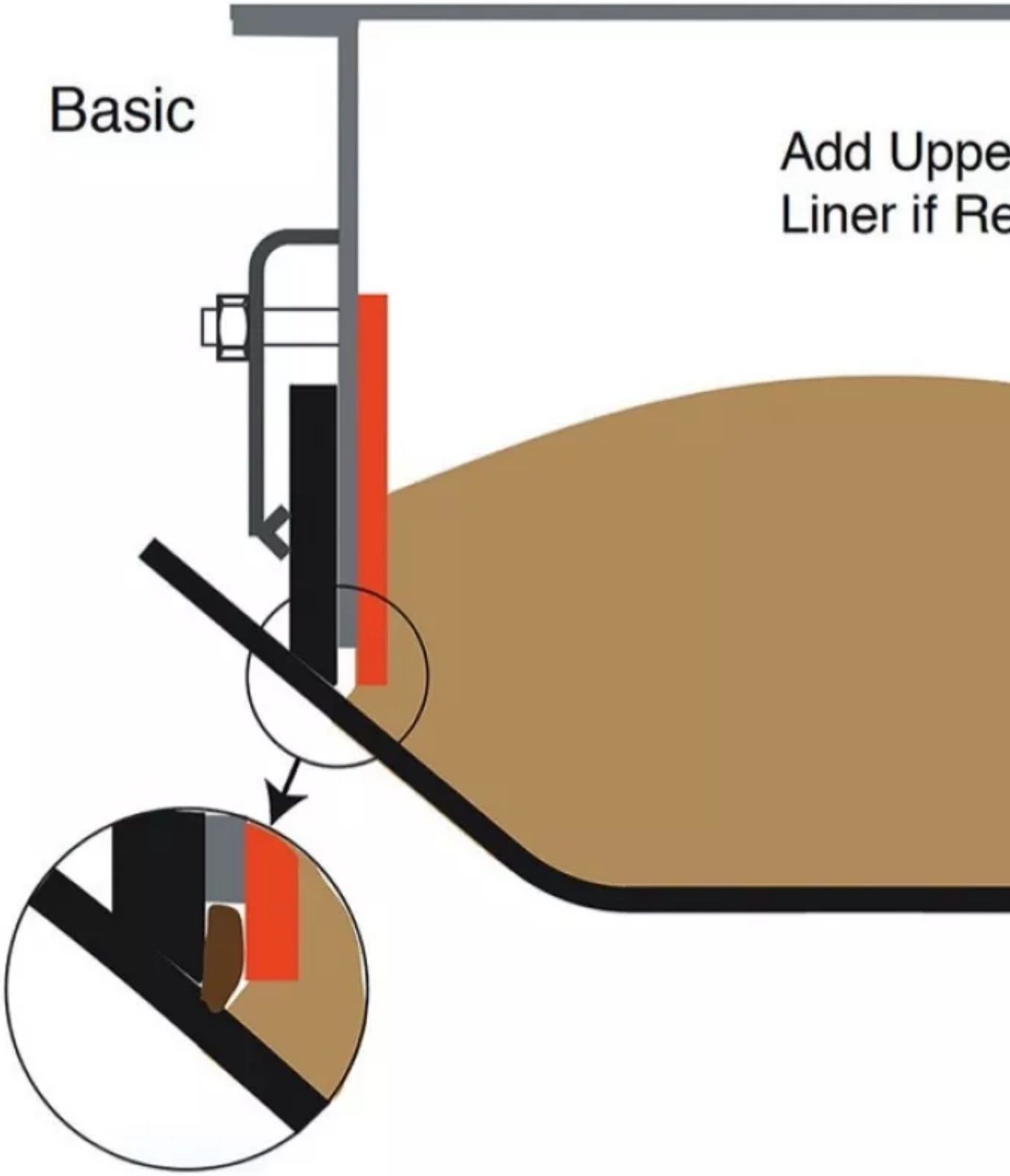

Fig. 2: Left: conventional external seal and internal wear liner can result in entrapmer
eliminates the gap.

Self-adjusting skirting maintains a seal automatically as belt path fluctuates due to its design, without the need for adjustment and only periodic inspection. A low-profile skirting assembly should need only 6 in. (152 mm) of clearance for

installation and maintenance in small spaces.

Skirting Best Practices

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. Managers contemplating a capital investment in a skirting and wear liner system should consider:

- Hiring an outside engineer to design the best system for the application.
- Installing equipment that features external maintenance.
- Utilizing a skirting strip that extends the entire length of the chute to avoid seams.
- Choosing skirting material that is free of fabrics, with a lower abrasion resistance than the belt.
- Installing a self-adjusting system.
- Choosing the option with the least worker exposure to equipment hazards.

Case Study – Grain Terminal In Brazil Reduces Dust

Dust and spillage clogs idlers, requiring them to be replaced and raising the cost of operation.

The Port of Santos in São Paulo is the busiest in Latin America. Operating at Terminal 26, T-Grão manages the import and export of over 4 million st/y (3.6 million mt/y) of malt, wheat, soy and maize.

Transfer points at T-Grão range between 32-50 feet (10-15 m) in height. The fugitive emissions affected air quality and visibility in the immediate work areas, forcing personnel to wear protective masks when working around any part of the conveyor system.

The dust often traveled beyond the site line, sparking complaints. Before the chute upgrade, a cleaning crew of 45 workers spent ~24 hours per month on dust and spillage cleanup.

The new loading zone featured a sealing system that mitigated spillage and dust supported by dust bags.

Martin Engineering technicians constructed a longer sealed enclosure with the ability to control airflow and give dust extra space to settle. They added several other critical components including external dual seal skirtboard and wear liner system. Impact cradles and slider cradles replaced the idlers to seal gaps in the chute.

Operators immediately observed significant results. As material moved through the system, particulates remained within the enclosure and either collected in the dust bags or settled back into the cargo flow. After a lengthy observation period, operators report that there has been less downtime for cleanup and maintenance, as well as improved workplace safety.

Conclusion

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.