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COAL INSIGHTS™

FROM MINING TO IGNITING

A LULL IN THE WIND?

Safety-minded employers' efforts lead to improved safety stats

Figure 2 - Proper signage should be displayed wherever a hazard presents itself.

Bill Shukla

Safety professionals in plants and mines around the world will tell you that a disproportionate number of injuries on the site are either directly or indirectly related to conveyor systems. Many injuries found in statistics presented by the Indian Ministry of Coal's Annual Report[1] occur from workers coming in direct contact with a moving conveyor, which should never happen.

The good news is that the number of injuries and fatalities have dropped significantly since the introduction of early 20th century regulatory standards. [Fig. 1] Regulations provide standards that can reduce health and safety incidents, but it's the efforts of safety-minded employers that lead to improved statistics. To say 100 percent of injuries can be avoided is unreasonable, but experts are of the opinion that many injuries could have been eliminated decades ago with the wider adoption of safer modern equipment designs.

The challenge for the companies is to get Production Done Safely™. With the financial benefits of safety demonstrated in reductions in downtime and the cost of operation, many companies are coming around naturally. But profit pressures that favour the lowest bid over the best solution often hamstring safety efforts.

Danger zones of belt conveyors

Conveying hundreds of pounds of bulk material per hour at high speeds under 24-hour schedules inevitably leads to an incident unless the right equipment, training and monitoring procedures are implemented. Awareness is the key component to identifying gaps in safety.

Commonly running between 0.5 and 10 metres per second [≈100 to 1968 fpm], the conveyor belt often runs faster than the average person can react to danger, even when simply letting go of a tool. Performing cleaning and maintenance duties around a moving belt made out of gripping rubber without performing the proper lockout/tagout procedures can be very dangerous. Even with incidental contact, a worker or tool can be captured and pulled into the mainframe, rollers, gears or pulleys.

Nip, pinch and shear points are common areas on the conveyor system where employees can be pulled in suddenly and either injured or killed. Nip points are between the belt and roller or pulley. Pinch points are smaller spaces between mechanical gears and rollers. [Fig. 2] Shear points are between moving and non-moving parts, such as a worker getting caught by the belt and pulled to the mainframe.

Fugitive material such as spillage, carryback and dust pose serious dangers, making it one of the most scrutinised topics of workplace safety. In mining and other dust emitting operations, respirable crystalline silica (RCS) and PM10 (particulate matter >10 micrometers in diameter) dust emissions are highly regulated, due to historical worker diagnoses of silicosis and pneumoconiosis (black lung) from both indoor and outdoor applications.

Spillage can make walkways dangerous, and carryback of dust and fines beneath conveyors can accumulate material on work areas, as well as spread particulate emissions along the entire belt path.

Additionally, spillage and dust can also be a factor in creating fire hazards by getting into the bearings and gears of rolling components, causing them to seize. Friction

All Coal Mines (India)	2015	2016
Serious Injury Rate per Metric Ton of coal produced	0.27	0.22
Fatality Rate per Metric Ton of coal produced	0.07	0.10

source: National Informatics Centre, Coal India Limited, Safety in Coal Mines Annual Report, 2017. https://coal.nic.in/sites/upload_files/coal/files/coalupload/chap11AnnualReport1617en.pdf

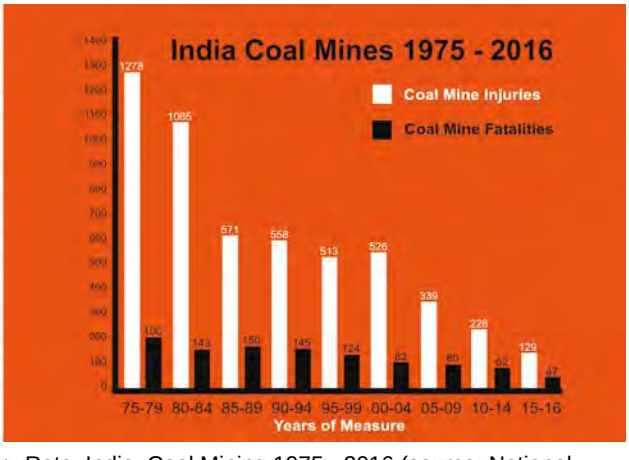

Figure 1 – Fatality and Injury Rate, India, Coal Mining 1975 - 2016 (source: National Informatics Centre, Coal India Limited, Safety in Coal Mines Annual Report, 2017)

Inspections should take a holistic view of the entire system.

can heat and ignite the belt and/or the cargo, and then convey it throughout the facility, rapidly spreading the flames. Mistracking can cause the belt to drift into the mainframe, shredding the belt and possibly breaking the splice. These factors are especially dire when handling material that emits combustible dust such as coal or petroleum coke (a refinery by-product).

Spillage and dust emissions can quickly create a hazardous work environment.

Unsafe work practices around the conveyor

Safety begins with detailed training of employees in an organisation. However, the upper management should be aware of operational factors that affect safety as well. The Foundations for Conveyor Safety[2] textbook and training sessions presented by Martin Engineering experts cover each component and section of the conveyor system.

Spillage can get into rolling components and cause them to seize, creating a fire hazard.

Thorough training of staff mitigates behavioural incidents that may seem safe at the time but are, in reality, extremely dangerous, such as belt riding, wearing loose clothing, reach-in maintenance and confined space entry.

Perhaps the most dangerous practice comes in corporate policy that puts production ahead of safety.

Top down pressure to improve the level of production causes supervisors to encourage employees to cut corners and reduce the time for maintenance procedures, to the detriment of the employees' safety.

Understanding danger areas, unsafe behaviours and the cost benefits of safety helps the managers to justify expenditures for safer and more efficient equipment. The act of Production Done Safely™ is a mantra that improves the environment for all who work on and around belt conveyors. ■

Research

[1] Staff. "Safety in Coal Mines Annual Report". Chapter 11, pgs. 85-99. National Informatics Centre, Ministry of Coal, Coal India Limited. New Delhi, India. 2017. https://coal.nic.in/sites/upload_files/coal/files/coalupload/chap11AnnualReport1617en.pdf

[2] Swinderman, Todd; Marti, Andrew D.; Marshall, Daniel. "Foundations for Conveyor Safety". Martin Engineering. Worzalla Publishing Company, Stevens Point, Wisconsin. 2016. https://www.martin-eng.com/content/product/690/safety-book

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