The Relationship Between Safety and Maintenance

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In bulk material handling by conveyor belt about 25% of all fatalities[1] and 60% of all safety incidents[2] occur during maintenance. Maintenance personnel spend on average 20% of their time just gaining access to the equipment to be serviced[3].

It is well established that the best way to reduce accidents is to design out the hazards. When it comes to maintenance, access and ease of service are key design requirements for improving safety. Providing adequate access for maintenance and easy to service components cuts maintenance time and reduces exposure and therefore improves safety. CEMA's **Belt Conveyors for Bulk Materials, 7th edition (the Belt Book)**, has many recommendations for access around conveyors and best design practices for safety.

A common issue in bulk material handling by conveyor is maintenance staffing. Keeping maintenance staffing the same while adding more and more equipment to control emissions or increase production is common. If production is increased by speeding up the conveyor, wear is proportional to the square of the belt speed. How many locations add maintenance personnel and wear parts budget under this common practice? Few if any. How many conveyor speed ups result in an actual increase in productivity – few if any.

While maintenance personnel are often skilled crafts people, they often lack a basic understanding of the conveyor as a **system**[4]. A key strategy to improve safety is to train maintenance personnel in the basics of conveyor design and how a change to one part or component of a system often can create latent personnel and equipment safety issues. For example, it is common to increase the take-up weight to deal with the belt slipping on the drive pulley. Increasing the take-up weight can, among many other things, reduce the life of all components that contact the belt, particularly the high-tension pulleys. Throughout the Belt Book, there are answers to many common conveyor system questions and practical application suggestions.

To facilitate better use of maintenance personnel and equipment, leading maintenance managers are practicing Predictive Maintenance which depends on condition monitoring. Periodically walking around with an infrared gun or doing vibration spot checks is being replaced with permanently mounted sensors that are monitored continuously. Chapter 14 discusses different maintenance strategies. Rather than change components based on a mean time between failure or just waiting for an unplanned down time event, predictive maintenance identifies the beginning signs of failure and allows for planned proactive maintenance. Reducing the need for manual measurements and performing planned maintenance, improves safety and increases productivity by reducing exposure to hazardous situations and avoiding unplanned downtime. **Chapter 14 of the Belt Book** discusses different maintenance and safety best practices.

[1] Analysis of MSHA Data by Martin Engineering

[2] Pulp and Paper Safety Organization 2004 IDCON Safety/Reactive Maintenance Survey

[3] Equipment World, Measuring Wrench Time In The Shop And How To Get More Out Of It, Tom Jackson October 2012

[4] Life Cycle Engineering, Inc. https://www.plant-maintenance.com/articles/BestMaintenance Repair Practices.pdf v Introduction to Tribology: By Bharat Bhushan