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ISSUE 33 - SEP-OCT 2024

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Measuring workplace training results

MARTIN ENGINEERING ASKS THE QUESTION: IS YOUR GOAL TO GET A RETURN ON YOUR INVESTMENT WHEN UNDERTAKING REQUIRED TRAINING HOURS?

Training employees can lead to significant improvements in production, maintenance labour, risk avoidance and cashflow.

Training should be robust enough to break the "we've always done it that way" mentality and encourage creativity in problem-solving with safety at the forefront of the design. Companies that place a priority on safety – and address fugitive material problems seriously – can benefit from fewer safety incidents, less regulatory oversight and higher productivity and profits.

Martin Engineering's online Foundations Learning Centre draws from the collective knowledge and expertise gathered over nearly 80 years of solving bulk handling challenges. Aimed at apprentice technicians and experienced engineers alike, the non-commercial information is offered at no charge and, as an extension of the Foundations training curriculum, the Learning Centre uses a mix of text, photos, videos, webinars, online events and live experts available to answer questions. Everyone who operates, cleans or maintains conveyors should be trained in the hazards of belt conveyors and bulk material handling. Operators and cleaning crews should have a basic understanding of normal conveyor operation and common problems so they can be aware there are ways to reduce day-to-day problems such as spillage and belt wander.

Basic training includes topics such as guarding, identifying problems and safe work practices. Appropriate safety training emphasises how the belt can store elastic energy, even when lock-out, tag-out procedures are followed, and why additional securing of the belt is required.

And with the retirement of many experienced operators and mechanics, coupled with the difficulty in finding new workers, it becomes critical that new employees understand the basics of conveyor design and operation.

Engineering and maintenance staff should be additionally trained in fundamental conveyor design concepts so they can analyse cause-and-effect relationships.

Visible signs of poor conveyor operation are often not the root cause of the problem. For example, using guide rollers to force the belt to track does not address the fundamental reason for the belt mistracking and usually results in belt-edge damage.

Training can often be on a specific piece of equipment, with the goal of creating trainers who can educate the rest of the maintenance department. This approach works well with certain types of equipment but ends up with one or two motivated and well-versed technicians who can troubleshoot.

A mechanic trained in installing problem-solving components can run into myriad physical constraints. Firstly, the original conveyor design and subsequent modifications can make it impossible to install equipment according to the manufacturer's instructions without a complete redesign. Secondly, structural obstructions or conveyor arrangements often don't allow enough room for installation, clear views for inspection or access for safe and easy maintenance according to industry standards.

Conveyor design training for engineers and mechanics is critical so they can diagnose problems with an understanding of fundamental

Personnel should receive advanced conveyor training so they can analyse cause-and-effect relationships.

Images: Martin Engineering

A professional safety inspection considers a third-party perspective that can be overlooked.

design methods. Systems are incrementally modified over time to minimise instances where belt speed and capacity exceed the original design specifications.

No two conveyors are identical and even side-by-side twin conveyors can act differently. So adhering to standard design methods allows one technician to make these slight adjustments and another technician to recognise the intentions even without the prior technician present.

TRAINING FOR RESULTS

Training alone rarely results in meaningful actions to improve conveyor performance. When management understands the clear links between safety, cleanliness and productivity, it is much easier to turn training into results.

There are many variations, but most success stories have common threads:

- Basic training in conveyor hazards and the methods for controlling fugitive materials
- Training in conveyor design fundamentals and the root causes of common problems
- Management participation in the training to show support
- A pilot program and measured results
- A long-term plan implemented from a successful pilot program

GETTING STARTED

A walkdown of one or two "problem belts" and a review of goals the day before the training help the instructor focus on site-specific problems. The goal is for the instructor to have actual examples to show the class that their problems are not necessarily unique.

The first day of training usually starts with reviewing typical problems and getting people in the class to talk about their specific challenges. The class then identifies a couple of problem conveyors and the splits into small teams – each team can look at the same problem or select different ones. Photos and videos of the issues are taken to be used in the problem-solving discussions.

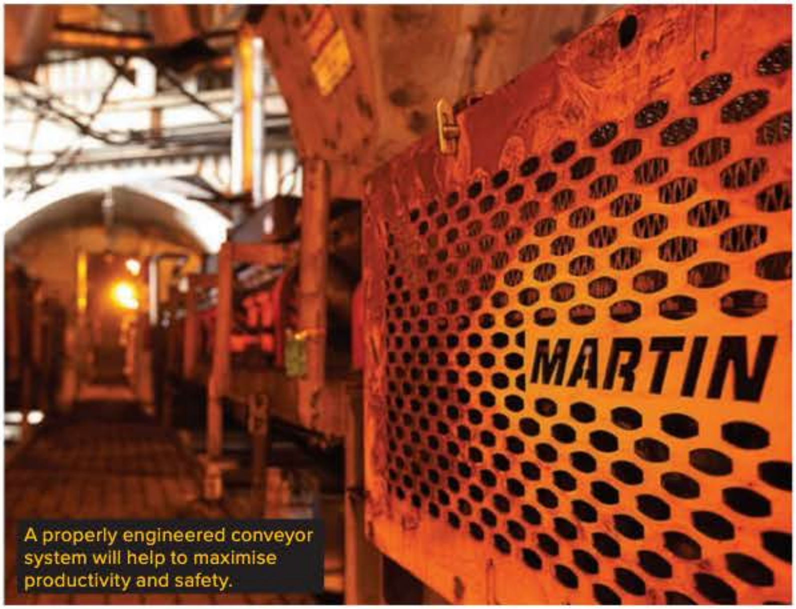
The rest of day one and the start of day two can be spent reviewing basic design principles that relate to the problem conveyors. The discussion can centre on possible root causes and solutions.

Once the teams reach an agreement on a way forward, they prepare a short presentation with the help of the instructor, using their actual conveyor problems and the knowledge they gained. The presentations may also include an estimate of the cost of the proposed solutions.

At the end of day two, management is invited to listen to team presentations and solutions. By participating in the presentations, management shows a commitment to making improvements and has an opportunity to ask questions, while the trainees, by making the presentations, show the knowledge they gained and support for the proposed solutions.

It is critical at this step that the members of management who attend the presentations have the authority to act on the proposals and are willing to potentially commit to a pilot program to prove theoretical results can be turned into reality.


The Martin Conveyor Belt Carryback Gauge estimates carryback on the return side of a belt.



A properly engineered conveyor system will help to maximise productivity and safety.

PILOT PROGRAM

One or more conveyors are selected for a trial. While it's normal to use the "worst" conveyor, keep in mind half measures don't get half results, so it's key to consider a project's scope.

Once a conveyor (or conveyors) has been selected, detailed proposals for retrofit can be obtained. An experienced person from the selected equipment supplier should overview the designs, offer feedback, and supervise the installation. Sufficient downtime must be allocated to properly modify the conveyor.

Measuring results from improvements is important but relatively straightforward.

Photos and videos of before and after must be taken, dust levels are measured using common instrumentation, spillage can be measured with buckets or trays in appropriate locations, and carryback is measured by placing a tarp under several return idlers close to the discharge pulley. The collected fugitive materials are weighed for comparison after the conveyor has been modified.

Dust and spillage sampling locations should be marked so tests can be accurately repeated after retrofitting and an improvement percentage can be calculated.

The length of time for collecting samples can vary from a day to a week and should give a good representation of the average or typical operating environment and weather conditions.

It is important to keep the dust monitor running even if the conveyor is running empty, as maximum fugitive dust levels are often detected when running conveyors empty long enough that the carryback dries out and becomes airborne.

The results of the pilot program are usually immediately noticeable, but there is a temptation to assume the problem has been fixed and to revert back to delaying maintenance without follow-up maintenance, causing the results to deteriorate.

The test period should therefore extend to the next scheduled maintenance shutdown, with periodic inspections and adjustments made by the equipment supplier in the interim to ensure optimum efficiency.

THE PAYBACK ON TRAINING

To demonstrate the benefit of safety to a company's bottom line, the Occupational Safety and Health Administration's (OSHA) online tool, '$afety Pays,' uses company-specific economic information to assess the potential economic impact of occupational injuries on that firm's profitability.

The program estimates direct and indirect costs and weighs them against financial details supplied by the company.

Experience has shown the motivation to take action developed in the classroom often defaults back to prior habits. A production-at-all-costs approach means problems and safety concerns may never go away, and employees have to accept the poor performance and added risks, which demoralises morale.

It is incumbent upon management to take the safety and maintenance training as seriously as the staff, listen to the concerns of employees and fix the problem the first time. S

OSHA's '$afety Pays' tool uses economic information to assess potential impact of occupational injuries.