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Using tech to separate people from moving

By Dave Harasym, Martin Engineering

Whatever you're processing, your conveyor belt network is the critical artery that moves material from raw feed to end product, which means conveyor performance is key to productivity and profitability. Keeping belts running efficiently demands that they are well-maintained to ensure they remain free from carryback, spillage and build-up that would otherwise cause excess wear and unscheduled down time.

Conveyors are also among the most dynamic and hazardous machinery in any processing plant, and manually inspecting and maintaining each component of a conveyor belt system across a wide area can be time-consuming, labour intensive and, crucially, involves significant exposure to risk.

Even though the entire operation's success depends on conveyor performance, the importance of well-maintained belt cleaners to overall productivity is rarely understood or prioritised by busy plant maintenance teams, unless they have a specially trained resident expert in conveyors. It is little wonder, therefore, that maintenance of components such as conveyor belt cleaners often get pushed to the bottom of the 'to do' list.

Until recently, the only way for maintenance contractors and in-house teams to identify what servicing was needed was to go physically to each belt cleaner location, taking all the necessary steps to address the significant hazards involved in inspection – from working in confined spaces with the risk of entrapment to working at height, from manually lifting and handling heavy guards or other equipment to dealing with fugitive dust and avoiding slips, trips and falls. These can all be documented in risk assessments and properly managed through safe work processes, but safety requires time and effort, including getting the correct permits issued, conveyors locked out and stored energy released from the belt. A major production plant can have in excess of a hundred conveyors, multiplying the risk and the time needed just to complete belt cleaner inspections – and that's before any servicing has taken place.

The sensor unit transmits data on blade wear life to a central on-site 'gateway' device which sends the information to the cloud.

Users of remote monitoring systems can access condition data on their mobile phones.

Because of the level of exposure to hazards – even to simply inspect belt cleaners – Martin Engineering began looking at how this common task could be made safer and more efficient; the same objectives that are behind everything the company does. The premise was that the number of inspection visits – and therefore the exposure to risk – could be reduced significantly through the application of Industry 4.0 technology, the so-called Fourth Industrial Revolution, by allowing service technicians to monitor the condition of each belt cleaner remotely, rather than having to visit each location physically.

Remote monitoring is already well established in some manufacturing sectors, and this tried-and-tested technology was adapted for use with conveyor belt cleaners. The result, after several years of research, was the development of the Martin N2® remote monitoring system, which tracks the condition of each blade. The system features a Position Indicator (PI) – a polyurethane collar embedded with a wireless sensor unit – fitted to each primary belt cleaner. The sensor unit transmits data on blade wear life to a central on-site 'gateway' device which sends the information to the cloud. From there users can access belt cleaner condition data in one place on an easy-to-use mobile app or desktop dashboard which predicts the re-tensioning cycle for each belt cleaner, and indicates when servicing should be scheduled or performed immediately.

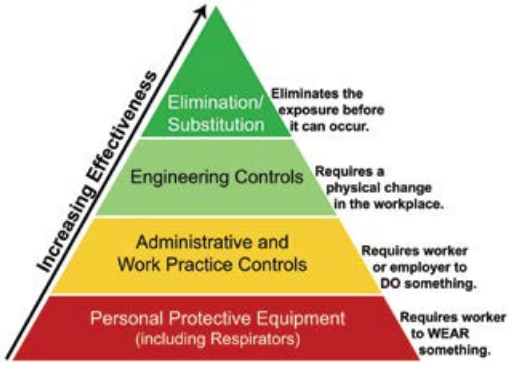
The smart thing about this kind of remote monitoring is that it goes straight to the top of the health and safety 'hierarchy of controls', eliminating needless inspection visits and significantly reducing the interaction between people and conveyors. Technicians need only visit conveyors when the system shows a belt cleaner needs attention, and often this can be planned for an already scheduled shutdown. It's the ideal solution, especially for large-scale mines, quarries and processing plants, which have numerous difficult-to-access belt conveyors distributed over a large production site.

Long-term trials have clearly shown the health and safety benefits of using remote technology for belt cleaners – a reduction in service visits, lower frequency of hazard exposure, increased up-time and fewer near misses related to maintenance. And the system is now in commercial use in a dozen countries, delivering results for mining operations, producers of steel and other metals, cement, lime and aggregates, among others.

In addition, fewer site visits means fewer

conveyors

Clean conveyors are key to achieving optimum plant performance.



Hierarchy of controls - remote monitoring with N2 delivers optimum control of risk by eliminating exposure before it can occur.

Above: Service teams can use remote monitoring data to visit the belt cleaner blades most in need of attention.

Left: The N2® PI is a polyurethane collar embedded with a sensor unit that fits onto the end of the belt cleaner mainframe.

instances of interaction between moving equipment and workers on foot, less worker exposure to dusty, noisy environments, and less paperwork associated with physical inspections. When service visits are necessary, these can be planned in advance to coincide with other plant maintenance, allowing time for effective safe systems of work to be put in place. Further, by minimising stoppages, with technicians only visiting belt cleaners that the system indicates need servicing, tensions between maintenance and production teams have been seen to diminish – less workplace stress can only be a good thing!

The N2 system is simple and low-risk to install. The gateway unit is the only element of the system that requires a mains power supply and is typically fitted at an elevated location within the plant – where the cell signal is strongest. The polyurethane collar of each PI fits over the exposed end of a belt cleaner mainframe (an extension component is available if the mainframe has been cut flush to the conveyor housing). Once the sensor unit is fitted with two AA batteries, each device is registered through the mobile app in a matter of seconds.

Now that remote monitoring technology is proven and growing in use worldwide, work is well underway on the next stages of development. Several avenues are being explored, including trials that combine the Position Indicator with an 'auto tensioner' on a belt cleaner. Not only does that eliminate physical inspection of belt cleaners, but also eliminates the need for them to be manually re-tensioned – a move that could further reduce visits to each belt cleaner by a factor of up to seven times on average. Another next step could include integrating N2 data into existing plant monitoring systems to allow belt cleaner condition to be tracked on the same central dashboard as other plant performance data.

Since its establishment in 1944, Martin Engineering has strived to enable industries to move from reactive maintenance to preventive and now predictive condition-based maintenance. The overarching aim has always been to reduce the need for workers to carry out routine maintenance that puts them at risk of harm whilst at the same time delivering better productivity.

Inspecting and servicing belt cleaners no longer needs to be a repetitive, labour intensive and physical task. Now, service personnel can simply look at their mobile phones or laptops to see what's happening with every belt cleaner in their plant, then plan and carry out maintenance, re-ensioning or replacement based on the data provided. The next generation of innovation to make bulk materials processing safer and more efficient is here. ■

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