Conveyor Idler Replacement Tool

Xstrata Coal Queensland - Abbot Point Bulkcoal

In Brief

Expanding operations at the Abbot Point Coal Terminal mean that the maintenance of conveyors is more important than ever. The processes involved in Maintaining Conveyor Idlers were identified by the Xstrata Coal Queensland team as activities that presented particular risks of injury and significant operating cost. The problem was resolved by two Abbot Point team members in a way that was both significantly safer and cheaper than many project engineers had recommended.

The Initiative

As part of the X50 coal terminal expansion, Xstrata Coal Abbot Point Bulkcoal was determined to resolve safety issues in relation to maintenance on the conveyor idlers on offshore conveyors, in particular trestle conveyors. The problems associated with maintenance on conveyors were:-

- No safe method was specified for replacing "V-Return" idlers onshore and offshore;
- Safer methods were required for removing idlers while working at height and over water;
- The Expansion Project had introduced restricted access issues for new conveyor systems – a new maintenance process had to take this into account

Alternative concepts were designed by project engineers to overcome the problems, but these designs often included the assembly of access equipment (scaffold or similar) to gain access and maintain the V-Return conveyor idlers. It was difficult to gain agreement from all stakeholders as various parties were concerned about the risks inherent in working on access at height and above water.

The Solution

The approaches suggested by the project engineers associated with this job were quite expensive. The solution, by comparison, is very cheap and completely effective. Each Conveyor Idler Replacement Toolkit consists of just a Hand pump, Idler Lift Tool, a Handle, Locking Pin and 2 hoses. The Idler Lift Tool is attached to the frame that holds a particular idler, the hand pump is activated and the idler is lifted out of position. The tool is slid along the frame via its handle and the idler is lifted out of position at the other end before being retrieved by sliding the tool (now holding the idler) back to the starting end of the frame.

The tool's sliding ability permits two workers to remove an idler while accessing the conveyor from the side, rather than underneath, eliminating the need for scaffolding. Because each idler is treated individually, this small amount of equipment is more than enough to complete a change out of an idler quickly and efficiently.

All components are transported in an easy to handle, robust, durable and light weight carry bag. The weight of the frame is 9kgs. The tool eliminates the need to build access equipment (scaffold or similar) thereby eliminating the potential for harm when installing and constructing access equipment.

The Conveyor Idler Replacement Tool was developed by two members of the Abbot Point Maintenance team. The simple yet effective design has the potential to improve similar activities in bulk handling facilities around the world.

The Benefits of the Conveyor Idler Replacement Tool

The Conveyor Idler Replacement Tool addresses all the identified safety issues and the design goes beyond that challenge insofar as it eliminates the need to access and use traditional manual handling techniques.

The Conveyor Idler Replacement Tool significantly reduces the need for highly skilled tradespeople to remove the idlers, therefore allowing operations workers to change out more idlers while utilising a safer procedure that does not see them working on scaffold above or near water.

Furthermore the Conveyor Idler Replacement Tool has the following benefits:-

- **Eliminates** the need to access difficult areas which is generally required when replacing idlers because it permits access from the side rather than underneath
- **Reduces** the risk of hand-related injuries because of the reduced exposure to pinch and crush points – the Idler Replacement Tool requires no hands to travel into pinch areas as the "inside end" of the idler is accessed by sliding the lift tool along the idler frame using the attached handle.
- It has become the **standard procedure** for idler change out, reducing the multiple procedures for different conveyor systems; reducing the need to upskill staff in each process, reducing the associated cost and reducing the risk of injury caused by process confusion;
- **Inexpensive** to construct and maintain at just $5,500;
- **Reduces** replacement and maintenance time that impacts terminal up-time. A typical idler replacement process can take 45mins depending on age or service life of the idler. Adopting the "CIRT" will improve idler replacement time by 15mins. Historical replacements run at one idler per shift or 14 per week and utilise up to three persons. Based on this, plant downtime can be reduced by 3.5 hrs per week. Man-hour savings total 10.5 (almost a single shift per week). Such calculations become even more critical when the terminal is operating at maximum capacity. Conveyors run at 4,500 tph. Time savings are greater for offshore idler changes, because there is no need to set-up, as originally proposed, an access platform. Savings of 30 minutes on replacement time are achievable.
- **Achieves a Risk Reduction** from High 17 to Low 2 –The risk rating uses the Xstrata 5x5 Risk Matrix. When applying the definitions the magnitude of the reduction becomes evident as shown below.

Risk	Likelihood	Consequence
H17	Could occur annually	Serious bodily injury (eg fractures), LTI > 2 weeks
L5	Could occur within 5 to 20 years	First Aid or Medical Treatment Injury

Transferability of the Conveyor Idler Replacement Tool

The device will be used across site for all "conveyor idler replacements" making them safer and more cost effective. But it is not a site-specific toolset. It can be applied to all conveyor maintenance operations and should be considered as part of any business's risk mitigation strategies. As a cost versus benefit measure it is a truly viable investment.

Supporting Resources Available:

The following documents can be provided:-

- 4 Engineering Designs;
- Video;
- PowerPoint Presentation

Innovation

This tool is an excellent example of innovation within tightly defined parameters. The cost both in real dollars and in time to implement the solutions suggested by project engineers were too great for the processes to be called efficient. By comparison, the Conveyor Idler Replacement Tool is a custom-designed, cheap solution that saves up to 30 minutes per replacement and thousands of dollars in material and labour. It is the very definition of innovation.