

# **Pneumatic Controlled Deflector Plate Sedgman Coal Wash Plant Rio Tinto Coal Australia - Blair Athol Mine**

## **The Problem**

Sedgman operates a 300tph coal washing plant on the Blair Athol lease. Coal is pushed into a dump hopper and is conveyed to the head chute. At times, material hangs up in the head chute causing down time in the plant, which affects productivity. Unscheduled delays and breakdowns usually result in unplanned work which is known to cause most injuries in the workplace. Any improvements to prevent or minimise unplanned losses will directly increase our probability of achieving zero harm.

When large lumps of coal became stuck in the head chute of the plant feed conveyor, operators were required to use a platform ladder to access the top of the head chute. They then used a crow bar to assist in the removal of the wedged coal between the deflector plate and the head drum of the conveyor.

The deflector plate is used to direct the coal over the teeth of the crusher. This assists in spreading the coal across the teeth to ensure even wear.

This practice had the potential to result in an injury to an employee due to the manual handling task and working in an awkward position. It could have also lead to equipment damage if the crow bar was dropped into the crushers below, causing them to jam.

## **Solution**

Using the Hierarchy of Controls, the highest level of control was chosen - elimination. This could be achieved by eliminating the need for the operators to stand on a platform ladder leaning over the head chute to remove the blockage.

The solution proposed was to install pneumatic rams which were designed to move the deflector plate approximately 150mm away from the head drum of the conveyor when activated. This allowed enough clearance between the deflector plate and the head drum for any blockage to clear without intervention.

The idea was developed by Anthony Looker and Simon Cassidy, Sedgman operator maintainers. The implementation of the idea and the subsequent installation of the deflection plate was completed by Damian Lloyd, Plant Manager.

The improvement won the Blair Athol 2009 HSE Innovation Award, and was submitted to the Sedgman Innovation Program for judging across the Sedgman group. A project initialisation form was submitted for the improvement which was approved.

The design team met a couple of times to brainstorm the finer points of how the moving deflector plate was going to work. Once the team agreed, the parts were ordered for the job. The fabrication took place in site during a shutdown and only took 12 hours to install. Once installed the deflector plate worked successfully with no issues from start up.

### **Benefits**

The installation of the moving deflector plate eliminated a number of manual handling tasks from our daily operation. These included: the risk of injury due to pinch points; eye injury from using high water pressure to clear the blockage; back strain; and the risk of slipping and falling off the ladder due to awkward position. These tasks had the potential to result in a lost time injury. Sedgman's Wash Plant celebrated seven<sup>7</sup> years lost time injury free in 2010.

The total benefit was not fully realised until the site management team noticed a steep decline in the number of reported head chute blockages. It has come to the stage where a blocked head is not even recorded in the SCADA (Sedgman computer control and reporting system) as a delay. For an outlay of \$8500 the deflector has already paid for itself due to eliminating of lost feed rate from removing blockages and the associated flow on within the plant.

One of the main benefits that the management team at Sedgman have noticed is the positive response that the idea received from other crew members. In addition, there is a belief that management will take on ideas and develop them, which instils confidence within the team to bring forward ideas and then act upon them as quickly as possible.

### **Transferability**

This simple, low cost modification provides protection for our work force from a potentially hazardous situation. Every plant across the industry has troublesome chutes which present the same issues that we identified. For a small cost outlay, the risk of injury can be eliminated.

Since the moving deflector plate has been installed, a number of improvements have been made which help in the locking and unlocking of the deflector plate. This was done by installing two pneumatic cylinders to lock the shafts in place which took the place to two manual locking clamps.

Since the inception of this idea, Anthony Looker has applied the same improvement process to another blocked chute problem within the plant.



Figure 1: Large lumps of coal stuck in the head chute of the plant feed conveyor



Figure 2: A crow bar being used to assist in the removal of the wedged coal between the deflector plate and the head drum of the conveyor.

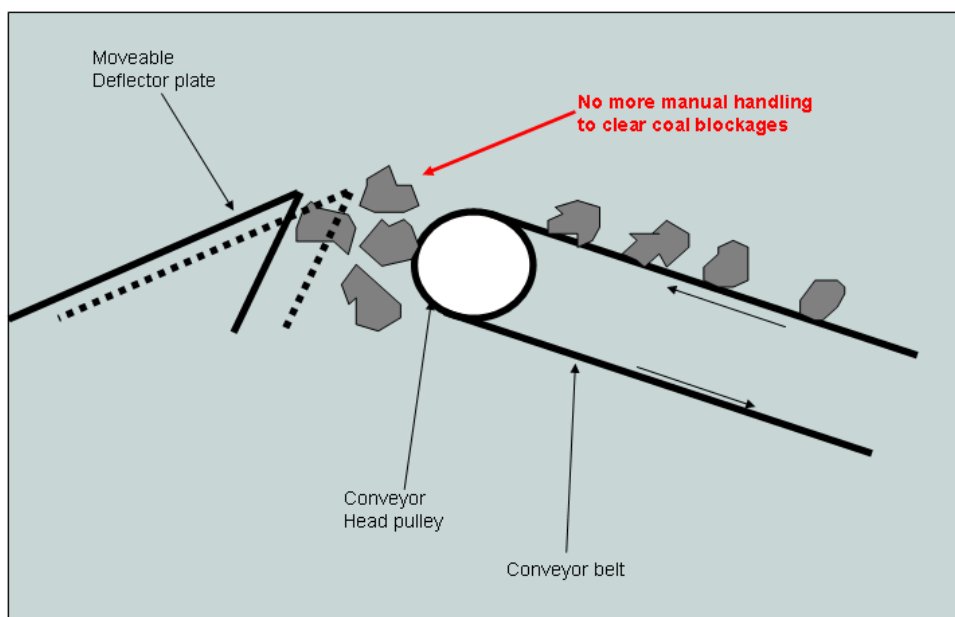


Figure 3: A diagram of the role of the deflector plate



Figure 4: Deflector plate movable mounting arm.

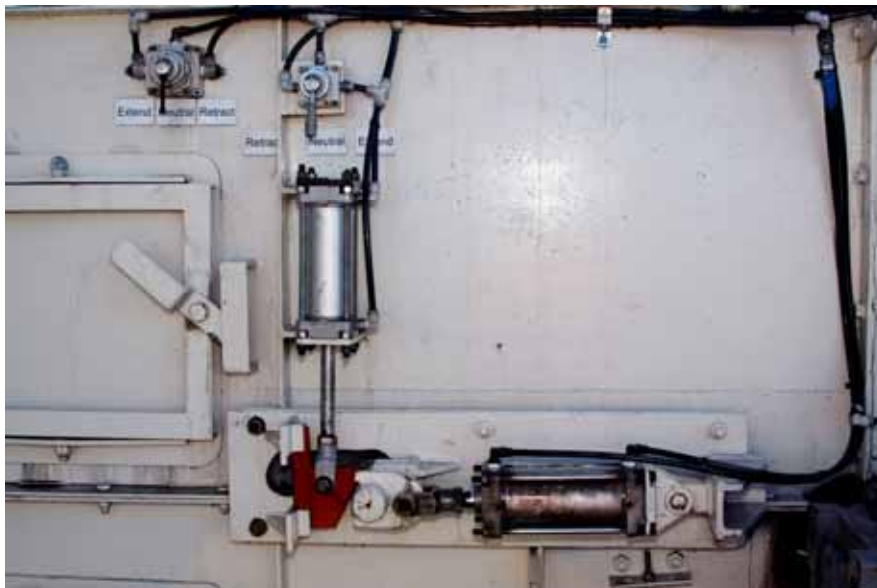


Figure 5: Locking arm and actuation arm for the deflector plate