Final Drive Wiper Arms

Xstrata Coal Queensland – Newlands Surface Operations

The Problem or Initiative

a) Identified problem

- During the wet season, Dozer final drives get covered in mud, allowing the mud to work its way into the final through the duo-cone seal and causes significant damage. This damage results in considerable business impact, namely maintenance repair costs, production delays, and exposure of maintenance personnel to unnecessary risk.
- Each time a Final Drive is removed from a dozer, the machine is floated to the Workshop. Isolation is performed and the job commences.
- To complete this task the track must be split and removed and cranage plays a significant part exposing the Maintenance personnel to a high risk activity (Fatal Hazard Protocol #9) throughout.
- Hydraulic tooling is required to split the track and torque bolts. The hydraulic pressures Fitters are exposed to while using the high torque is 10,000psi.
- The actual monetary cost to the business is $20,000 (average repair cost) to reseal each final drive. This occurs on average five (5) times per year after the wet season resulting in 10 (ten) final drives sent off site.
- It takes approximately 5 days to reseal a final drive off site meaning that the dozer is out of service for this time and not available for Production.

b) How the improvement opportunity was identified

- This initiative was driven by an individual's response to an internal problem.

c) What health and safety consequences were to be addressed

- Cranage exposes the Maintenance personnel to a high risk activity (Fatal Hazard Protocol #9) throughout.
- Hydraulic tooling is required to split the track and torque bolts. The hydraulic pressures Fitters are exposed to while using the high torque is 10,000psi. This creates risk of operator injury.

The Solution

a) Strategies and initiatives developed to identify and address the problem

- Ashley Carvolth took the initiative to design a final drive scraper (wiper arm) which attaches to the final drive and removes mud and build up from accumulating around the duo cone seal area.
- This initiative is a cheap, simple and feasible engineering solution to a common and expensive business problem and reduces the exposure of maintenance staff to unnecessary risk.

b) Internal and external resources used

- The innovation was designed and developed by an employee of the Newlands Surface Operations Maintenance Department (as mentioned above) in response to an identified safety and production issue.
- The device is made up of:
  - -1 length of flat bar (different sizes for the D10 & D11 models)
  - - 2 pieces of angle iron
  - - 2 lengths of neoprene for the wiper arms
  - - 6 bolts
  - - 6 nuts
- The flat bar is rolled to a ring shape to fit around the final drive. The ends are bent to 90 degrees to form the clamping device. The angle iron is welded to the flat bar at 180 degrees apart. The neoprene is cut to length and bolted to the angle iron. Holes are drilled in the clamping device and the device is fitted to the machines.

c) Methods used to trial and test.

- The Planned Maintenance Coordinator has developed the design and worked closely with offsite suppliers to fine tune.
- The wiper has been running under trial conditions for 6 (six) months and has proved effective.

d) Implementation process

- It has been implemented through the NSO Planned Maintenance group.
- Now that trial stage is complete and the design will be installed on all machines the improvement has been communicated through email to each crew.
- This is now part of the planned maintenance strategy for all dozers on site.

e) Demonstrate how hierarchy of control has been applied

- There are a number of production and safety benefits to this innovation.
- Due to the nature of the tasks in Opencut coal mines, and the rain encountered during the wet season, this task is inevitable.
- However, through application of this engineering control, exposure to the task and to the hazards associated it is significantly reduced.

Benefits / Effects / Outcomes

a) Safety and occupational health benefits

- Maintenance personnel exposure to a high risk activity (FHP #9 Lifting and Cranage) will be reduced.
- Maintenance personnel are being exposed to 25-30% more final drive change outs than is necessary, increasing exposure to injury.
- Manual handling exposure will be significantly reduced
- Exposure to high pressure tooling will be significantly reduced.
- Reduction in the amount of dozer downtime (Final drive component life is 12,000 hours which is not consistently being achieved without removal and a reseal).

b) Supporting data

- The wiper has been running under trial conditions for 6 (six) months and has proved effective in reducing downtime and associated risks associated with the task.

c) Extent of deployment

- The design has been a success and the scraper will be fitted to all dozers in the Newlands Coal open-cut fleet.

Transferability

a) Potential for innovation to be used, modified, transferred across the industry

- This modification is not a standard dozer component. It is above normal safety standards due to the fact it has reduced the exposure of Maintenance personnel to high risk activities.
- The design has considered the possibility of machine damage in the event of a rock falling behind the track. The device is designed to spin due to it being clamped not bolted or welded. This will prevent damage to the device and machine.
- This innovation can be utilized for all other dozers across the industry. It requires no modification to the final drives.

Innovation

a) Originality of the innovation

- This is an original design, unique to Newlands Surface Operations.

Approximate Cost

a) Statement of approximate cost, if known

- Device manufacture and install is low cost.
- Total parts are $800 per machine.
- Total Maintenance hours to fit is 4 hours per machine.