

Monorail Beam Installation and Salvage System

Glencore Oaky Creek Coal: Oaky No 1 Underground Mine

The Problem

Oaky No. 1 uses a monorail system to safely and efficiently manage the services required to operate the longwall face. The roof-mounted monorail increases safety by keeping walkways unimpeded, and eliminates the manhandling of heavy cables and hoses. However, the nature of longwall mining means the monorail system must be constantly moved as the face advances.

Moving the monorail beams has traditionally been a labour intensive task that involved the following manual handling components:

- retrieving the 35kg beam from the roof
- manually carrying the beam for 30 metres under the incoming rail system, usually with poor floor conditions
- loading the beam onto the underslung monorail sled to transport it to the unloading area
- retrieving beam from the underslung sled
- carrying the beam another ten metres to the transport pod
- depositing beam into the transport pod.

During the life of the mine to date, it's calculated that 2,800 tonnes of beam have been lifted by personnel, and a beam carried by underground personnel for a total distance of 800km. SiteSafe statistics reflect the high manual handling risk, with the Monorail System showing a high incidence of crush, strike, strain and trip incidents.

The Solution

The Monorail Beam Installation and Salvage System includes the design and manufacture of purpose built storage pods that are mounted on the work platform at the point of monorail salvage. The beams are slid directly into the pod, with the individual compartments providing protection against damage to the mounting brackets. The pods also incorporate provision to store chains, brackets and roof mounts required for each beam.

Previously there was no specific storage space for these items, with the result that these were treated as consumables rather than valuable components of the system. Over \$130,000 worth of brackets have been replaced during the mining of two blocks, with many of the discarded brackets being left on the walkway, themselves becoming trip hazards.

The development of this system was the result of a consultative process that involved the workforce, management and the OEM contractor.

After the mining of one block, the longwall was brought to the surface and a mini-build was instigated to review multiple issues that had been experienced. The site workforce identified monorail salvage as an area of concern, and a search of the safety stats database confirmed this was a High Priority issue.

Available workable space was identified as one issue, and a brainstorming session was conducted to determine what equipment could be moved. This included a review of times individual equipment was used during the mining of the longwall block. Several concepts were put forward, drawn up and worked through on paper. This included moving a range of hydraulic controls to more suitable locations, making the salvage work area less cluttered.

The frequency of the retrieval of the monorail beams meant this task should be a high priority and given the maximum available space to complete this task.

Three iterations were developed on paper before fabrication of the storage pod and push sled was undertaken. The storage pods were designed onsite, and fabricated by Macquarie Manufacturing, a NSW company.

The sled and other structures were fabricated on site by retrofitting an unused shield-dragging sled to be used as a floating pontoon for the storage pod.

The storage pod and sled were incorporated as part of the mini-build and underwent surface trials and a risk assessment with the workforce.

Some minor issues were identified and fixed. These included the addition of mesh plates to cover gaps in the flooring platform to better improve the work area, a chain support system to limit articulation of the floating pod, and a chain system to retain the rails in the pods.

The Risk Assessment has now been signed off and the system is installed underground ready for mining of the next block (due to commence on the 5th of June 2015).

In regard to the hierarchy of controls, the Monorail Beam Installation and Salvage System eliminates the carrying hazard completely, and is an engineering control with regard to the lifting hazard.

Benefits / Effects

The new Monorail Beam Installation and Salvage System will become fully operational underground when the next longwall block at Oaky No 1 commences in mid June 2015. However, we expect this to confirm that the system will deliver significantly improved safety outcomes, including:

- a reduction of lifting tasks involved in retrieving each 35kg beam by 50% (from a minimum of 4 to 2 movements)
- a reduction of carrying tasks by 100%, from at least 40 metres to nothing—there is now no need for beams to be carried manually
- a reduction in potential for trips and other injuries.

Retrieval of the monorail beams was previously one of the least preferred underground tasks. Feedback from personnel during the mini-build is that it will become one of the favoured underground tasks.

The beams slide easily into the compartments of the purpose built storage pod. Once the end is engaged the load is halved immediately, and further reduces as the beam is slid fully into position.

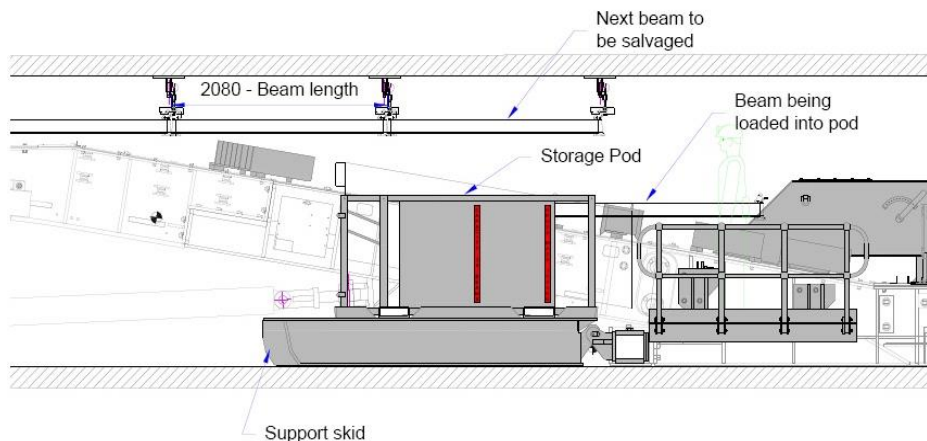
Monorail beams slide easily at a comfortable height into the individual compartments of the storage pods which protect them from damage.



The working platform is now much less cluttered, with only hydraulic controls related to beam salvage, a communication unit and a safety hydraulic dump valve operation device mounted in the area. This reduces the potential for trips and other injuries.

Apart from the health and safety improvements provided by the system, the storage pods provide some cost-saving advantages:

- The storage system prevents damage to beams.
- Audit time is reduced as the end brackets are easily accessible for inspection.
- An inspection Go / No-Go tool is chained to each pod to enable efficient checking of beam compliance.
- Dedicated storage area for chains, brackets and roof mounts means they will be available at next installation point.



Working diagram of storage pod system development



Original work platform set up showing location of hydraulic controls that have now been shifted to more convenient locations.



New decluttered work platform, showing storage pods and skid (as part of the mini-build).

The work area has been further improved by the addition of mesh plates to cover gaps in the flooring platform.

Transferability

The Monorail Beam Installation and Salvage System is easily transferable to any underground longwall mine. It is a simple idea that can easily be adapted by any component manufacturer.

Innovation

This innovation was developed by consultation with personnel who actually perform the tasks. Its innovation is in its simplicity—take away equipment and controls that aren't used frequently to make room for a system that makes a frequently-performed and potentially hazardous task much easier and much safer. Use machinery to carry equipment rather than personnel.



Example of how beams were previously stored, with obvious potential for damage to ends.

Approximate cost

Approximate costs include:

Storage Pods x 10	\$45,000
Mounting Sled and Structure	\$10,000
Installation platform	\$45,000

Compare this with the amount spent on lost brackets alone (\$130,000 in the last 2 years) and it can be seen that the innovation has paid for itself already without even considering the potential for drastically reduced manual handling injuries.