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Cooranbong

THE HIGH TENSION CABLE

HANDLING SYSTEM

BACKGROUND

At a routine monthly meeting of the Occupational Health and Safety Committee held in August 1992 an agenda item was a statistical analysis of accidents which had occurred in the 1991/1992 financial year. Selected parts from that analysis are reprinted below.

Part of Body Injured

	Reported	L T I	% of LTI
Back Injuries	106	31	38%
Hand & Finger	61	6	7%
Shoulder/Arm	62	11	14%
Knee Injuries	44	7	9%
Head/Neck	69	10	12%
Foot/Ankle	24	4	5%
Leg Injuries	12	3	4%
Upper Torso	13	4	5%
Abdomen	7	3	4%
Eye Injury	37	2	2%

Agency of Accident

	Reported	L T I	% of LTI
Manual Handling	149	40	49%
Slip, Trip, Fall	80	16	20%
Struck By/Against	89	8	10%
Falling/Flying Material	37	3	4%
Operating Vehicles	25	6	7%
Using Hand Tools	17	2	2%
Falls of Roof	15	2	2%
Falls of Rib	5	1	1%
Others	21	3	4%

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Accidents by Classification - 1.1.92 to 30.6.92

	Reported	L T I	Hours Worked	LTI frequency
Mining	147	24	166,831	144
Mechanical	36	7	52,537	133
Electrical	33	7	35,879	194

Analysing the table for "Part of Body Injured" it became clear that Back Injuries could be classified as Straining Injuries and these could be added to by including most of the Shoulder/Arm Injuries, a proportion of the Leg Injuries and certainly the Abdomen Injuries. The true figure for Straining Injuries was therefore probably nearer to 50% of all lost time injuries at the mine.

The OH&S Committee requested that a more detailed analysis of the forty (40) lost time injuries from Manual Handling be undertaken. From a mine employing an advanced materials handling system the list of items being manually handled and resulting in injury was disturbing. It included the handling of machine parts, oil drums, ventilation ducting, roofbolting machines, bundles of roofbolts, pipes, timber props, bags of stonedust, sheets of mesh, tool bags and the most frequent item identified, electrical cables.

Faced with this list of agencies the OH&S Committee made a decision. They concluded that the only way forward was to adopt a systematic approach. It was therefore decided that a project team be formed to conduct an analysis of the functions involved in transporting, installing, using and retrieving electrical cables. The original team consisted of:

K Millington - Electrical Engineer
T Glashoff - Shift Undermanager
B Field - Deputy
K White - Electrical Check Inspector
J Prisk - Check Inspector
G Sharp - Electrician
J Carlisle - Safety & Training Coordinator

The group was assisted by further analysis of cable handling incidents which produced the following facts.

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The manual handling of electrical cables accounted for 35 of the 216 reported manual handling accidents **(16.2%)** and for 8 of the 38 lost time injuries **(21%)**. By further analysing Table 3 the following facts emerged:

* **Mining Personnel**
  20 of 147 reported manual handling accidents associated with cables **(13.6%)**
  4 of 24 of lost time injuries from manual handling associated with cables **(16.6%)**
  2 lost time injuries from handling trailing cables
  2 lost time injuries from handling high tension cable

* **Electrical Trades Personnel**
  10 of 33 reported manual handling accidents associated with cables **(30.3%)**
  3 of 7 lost time injuries from manual handling associated with cables **(42.8%)**
  2 lost time injuries from handling trailing cables
  1 lost time injury from handling high tension cable

* **Mechanical Trades Personnel**
  4 of 36 reported manual handling accidents associated with cables **(11%)**
  1 of 7 lost time injuries from manual handling associated with cables **(14%)**
  1 lost time from handling trailing cable

With the assistance of the above statistics the group performed a series of Job Safety Analysis on aspects of the use and transport of trailing cables. From this work a number of recommendations were subsequently adopted. These measures included the replacement of pallets to transport trailing cables with a basket arrangement. This allowed procedural changes to occur which required greater use of the MPV Pod Transport system to eliminate wherever possible the need to manually drag cables. In addition cable handling devices have been successfully fitted to Continuous Miners which keep the trailing cable clear of the machine tracks and the shuttle cars without requiring a man's intervention. The introduction of these measures has led to a significant reduction in reported injuries from this agency.

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When the group commenced an analysis of the methods in use to install and recover High Tension Cable it became obvious that a significant safety problem had been identified. No changes to the procedures in use could avoid the need for men to become involved in what was an arduous and extremely physical operation. It was the view of the group that it was good fortune that more injuries had not been sustained from this source. It was concluded that an engineering solution was required to eliminate or significantly reduce the manual handling aspects from the operation. It was therefore decided to form a small working party to investigate this. The three man group consisted of:

Greg Briggs	-	**Assistant Electrical Engineer**
Ken White	-	**Electrical Check Inspector**
Alan Marshall	-	**Boilermaker**

Over a number of months the group experimented with the concept of lifting aids which could be applied to this operation. During this time they sought the advice and assistance of other mine employees of various classifications and to numerous to name. The end result was "**Effie**" the electricians' friend. It is a device incorporating a system of rope and pulleys which when applied gives a mechanical advantage of 8 to 1. With it one man, without strain, can easily guide High Tension Cable onto a spool as it is being wound. Previously two men were required to manually lift and support the cable as it was being wound. The device was placed into use in January 1994 and was declared an instant success.

Attention now was turned to Stage 2 of the project

To turn the cable reel onto which the cable is being wound a length of wire rope was utilised. The rope was wrapped around a race at the base of the spool and attached to an Eimco 913. The machine was then driven away thereby turning the spool. A man was required to hold tension on the free end of the rope to maintain friction between the rope and the race. The process was unsatisfactory. Early thoughts to improve this involved placing the spool vertically on a shaft where it could be turned easily. The spool however is required to hold 500 metres of High Tension Cable and the overall diameter would make the unit too high to deploy underground.

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The Mine Electrical Engineer **(K. Millington)** proposed that a chain could be fitted to the race and a hydraulic motor mounted at a corner of the unit could engage with the chain and turn the spool. The services of a local Engineering Company (Macquarie Manufacturing) was enlisted to assist with construction of a trial unit. This again was a success with the hydraulic motor being connected to the power take-off of an Eimco 913.

The mine now had a High Tension Cable Recovery System which eliminated all manual handling from the process.

This left one further area to be addressed.

Stage 3 of the project concerned itself with the installation of High Tension Cable.

The original process required setting up the spool containing 500 metres of cable at a start point. An Eimco 913 was utilised to pull the cable off the spool and lay it out along the roadway. Men were then required to physically lift the cable to roof level where it was secured.

The group devised a cable roller attachment which secures to the back of an Eimco bucket. In use the Eimco first is used to lay the cable along the roadway and then is utilised to support the cable as it is being secured at roof level. One initial lift is required to place the cable onto the attachment and then by raising and lowering the bucket the required hight can be maintained and by slowly driving the vehicle the cable is supported as the installation proceeds.

The cable roller attachment has proven to be of benefit in the installation of all cables including face feeders and other fixed cables. All Eimco 913s at the mine have been modified to allow the cable roller to be fitted and at every opportunity this valuable attachment is utilised.

The application of the results from the three stages of this project are in total the High Tension Cable Handling System.

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Since the introduction of "Effie" in January 1994 and progressively the other aspects of the system, no accidents have been reported associated with the manual handling of High Tension Cable.

The complete system was designed on-site at the mine by the men actually involved with the job.

The total cost of development was $10,500.

The benefits gained from the system are:

- ***Every time an injury is avoided a potential average claims cost saving of $4,000 is achieved!***

- ***The manpower required to perform the task has been reduced from six men to three men!***

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In use the system can be described as being:

S imple in design

A ffordable

F unctional

E xposure to risks minimised

T otal user ownership

Y ear to date injuries Zero

The project team is still active and intends to continue developing the system.