Queensland Mining Industry Health and Safety Conference

'step change'

to a safer future

5 - 8 August 2007

Jupiter's Townsville Hotel and Casino

QUEENSLAND MINING INDUSTRY HEALTH & SAFETY CONFERENCE 2007

paper abstracts and innovations

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Improving Safety Through Better Equipment Design: A Global Industry Project

Presenter

Alan Miskin

Global FRCP Facilitator, Surface Mobile Equipment, BHP Billiton

Most fatalities in the Australian mining industry involve equipment operation or maintenance. Causal factors include behaviour, the work process and equipment design. The latter appears to contribute significantly to fatalities and lost time events. In March 2006, three mining companies met to discuss approaches to engaging with surface mining equipment Original Equipment Manufacturers (OEMs) about improving equipment design. ACARP also funded a 2006 project to examine human factors engineering in the design of large surface mining equipment. The multi-company initiative and the ACARP project were combined in mid 2006.

The Earth Moving Equipment Safety Round Table (EMESRT) was formally established in the 3rd quarter of 2006 with six member companies and a Terms of Reference. The member companies for 2006 were Anglo American, BHP Billiton, Newmont, Phelps Dodge, Rio Tinto and Xstrata, with Barrick joining in early 2007. The project involves engaging with OEMs, initially haul truck OEMs, to speak with “one voice” about H&S equipment design issues. In 2006 the six companies met with six OEMs at their North American offices to initiate the engagement though establishing the issues, providing two major areas of need (access/egress and falls from height) and challenging the OEMs to define a potential productive engagement process with EMESRT. The OEM response to these meetings was used to guide development of the 2007/2008 EMESRT action plan.

Fifteen human factors issues have been identified as priority areas for 2007 and 2008. Development of the eight priority design philosophies for 2007 is being championed by focus leaders drawn from the EMESRT member group. EMESRT will also engage the OEMs in other areas such as the development of Operability and Maintainability Risk Assessment methodology to assist with the systematic review of new equipment design. MISHC is assisting with gathering input on design requirements, reviewing related ISO standards, and sourcing information about events or incidents related to the relevant design philosophy.

This presentation will briefly overview the history and nature of EMESRT and the progress made to the present time.

Ergonomics

Information Gateway for Improving Human Factors Design

Presenter

Sue Leveritt

Senior Research Officer, Minerals Industry Safety and Health Centre

The Earth Moving Equipment Safety Round Table (EMESRT) is a recent initiative that supports the industry's overall drive to a safer future. Seven of the major global mining companies have aligned their goals to accelerate the development and adoption of leading practice designs of earth moving equipment that minimise Health and Safety risks.

EMESRT has identified 15 separate issues as priority areas for improvement in the human factors design of earth moving equipment. Design philosophies with clearly identified objectives and general outcomes have been developed for each of these issues. These objectives and outcomes provide the focus for risk mitigation related to each issue.

EMESRT has elected to disseminate Information about these design philosophies using a web based system - the Minerals Industry Risk Management Gateway (MIRMgate). This presentation will examine trends in MIRMgate resources, particularly innovations and lessons learned documents, which highlight the risks to be mitigated when designing for human factors.

MIRMgate also functions as a communication tool through its alerting service. This presentation will provide an overview of the process for MIRMgate users to gain ready access to EMESRT related information using the new EMESRT Alerting Service.

Paper Abstracts

Ergonomics

Can Improvements In Design of Mobile Plant Improve Safety Outcomes In The Mining Sector

Presenter

Darryl Casey

Inspector of Mines, Department of Mines and Energy

The New Victorian Occupational Health and Safety Act 2004, Section 28 was primarily enacted due to continued elements of design featuring in accidents. The new legislation has increased penalties fourfold for Manufacturers, Suppliers, Construction and Designers. The new penalties will apply from July 2006 and now carries the same penalties for employers-$1m.

The mining industry is no exception to these problems in design related incidents and accidents where large materials handling equipment is required in the mining industry result in indiscriminate death of employees. Mining Manufactures now realise that the needs of people must be incorporated in the life cycle mining equipment, both operationally and from a maintenance point of view.

Australia's major mining states have enshrined rigorous risk management techniques for all major hazards. They are inclusive of a facility description, safety management system and risk management analysis with associated controls. Greater employee involvement at the design stages for such equipment is thought to provide the key to improve safety in the mining sector but is not enshrined in the new legislation.

Given the enormous resources and effort by the industry and regulators over the past decade to improve safety in the mining industry can mine design approach assist in the elimination of death, injury and illness in the mining industry?

Fight or Flight

Self Rescuers / CABA Self Escape

Presenter

David Stone

General Manager - Emerald Region, Xstrata Coal

In October 2006 an emergency response seminar was held in Emerald. This seminar was named Fight or Flight (the first 5 hours) and was organised by the Chief Inspector of Coal Mines (CICM) Queensland in response to ongoing recommendations and issues raised from the Queensland Level 1 Emergency Exercises as well as two explosions at underground coal mines in the USA namely Sago January 2006 and Darby Mine May 2006. There appeared to be issues relating to emergency evacuation, first response in all of the cases. The intent of the seminar was to identify all of the issues which were perceived to be relevant and formulate a methodology to address and resolve the issues aiming at standardisation across the mining industry when ever possible.

Industry professionals from Queensland, NSW and New Zealand attended this seminar. There were guest speakers from the USA. Full details of the proceedings of the seminar are available from the CICM Queensland. The issues raised at the seminar were documented and fell in to three groups - Self Escape, First Response and Support and Research. Each of the groups were required to review world wide practice and equipment, as it is relevant to emergency response, in addition to the review and consideration of the recommendations from the Moura Warden's report and associated Task Group Reports. "Improving Mine Safety Technology and Training Report - USA September 2006" and all Industry Level 1 Emergency Exercise Reports. Practical constraints in implementing recommendations were also to be considered and discussed.

Volunteers were sought from industry to take part in each of the groups, with the following charter:

Sub Committee 1: Self Escape

Objective: To recommend best practice in self escape of workers from underground coal mines

Must address the following Emerald workshop outcomes

- What options are available to SCSR and other escape breathing apparatus (CABA, SCUBA, Drager etc)
- Identify risks and limitations for each option
- Develop guidelines for training standards
- Scope communication requirements to minimise risk - provide scope to SC 3
- Review options for SCSR change over process
- Standardisation of caches, location, design
- Identified shortcomings in existing apparatus with suggestions on design standard improvements

- Tracking of people needs including communications with surface and location update - refer issues to SC 3
- Tracking of SCSR batches to cover contractors and industry advice
- Review problems with maintenance and testing of escape apparatus over life of unit against the current standard
- Special considerations for low height seams - refer issues to SC 3

Outcomes and final reports are due by the end of August, however each of the groups will present their findings, and where practicable, recommendations, at the Conference.

Fight or Flight

CABA First Response

Presenters

Geoff Nugent
Operations Manager, Queensland Mines Rescue Service

Ken Singer
Compliance Manager Anglo Coal Capcoal Underground

On behalf of Sub Committee No.2. Ken Singer, Geoff Nugent, Paul Cuddihy, Greg Dalliston, Ron Mckenna, Kylie Ah Wong, Doug White, Ian Tyson, Andy Mifflin, Tim Watson

Context and Purpose

In October 2006 an emergency response seminar was held in Emerald. This seminar was titled *Fight or Flight (the first 5 Hours)*. This seminar was organised by the Chief Inspector of Coal Mines (CICM) Queensland in response to ongoing recommendations and issues raised from the Queensland Level 1 Emergency Exercises, as well as two explosions at underground coal mines in the USA namely Sago January 2006 and Darby Mine May 2006. There appeared to be issues relating to emergency evacuation, and first response in all of the cases. The intent of the seminar was to identify all of the issues which were perceived to be relevant and formulate a methodology to address and resolve the issues aiming at standardisation across the mining industry when ever possible.

From this seminar volunteers were sought from industry to take part in a committee to review current industry (both Domestic and internationally) best practice also identify and recommend any additional requirements for effective First Response strategies and processes to assist industry achieve best practice. The paper is the status report from Group 2 “First Response” based on the bellow charter.

The Charter of Sub-Committee No. 2 (First Response) is;

- *Recommend best practice in providing a first response by workers at the mine in the event of an emergency situation that may involve*
  - *Assisted escape of persons*
  - *Fire control*
  - *Medical assistance to persons*
  - *Repairs to ventilation and/or communications system*
  - *Strata control*
  - *Others as determined by the mine SMS such as chemical spills*
- *Outcomes should be based on risk management principles and include short and long term options suitable for implementation into industry*
- *Identify where legislative change is required*

The paper will discuss

- Definitions of First Response
- Why is effective First Response important?
- Recommendations of Level 1 Emergency Exercises (the story so far)
- Discus Current Legislation and implications on First Response
- The Process adopted by Sub Committee 2.
- First Action Response Plans (FRAPs) with examples.
- Equipment Research and Development:
- Direction for Assisted Escape/Aided Rescue and the issues posed with proposed controls.
- Discuss recommendations for any legislative change and development of Recognised standards and/or training packages.
- Progress of Risk Analysis for Assisted Escape/Aided Rescue.
- Future Direction for the committee and developing recommendations for industry.

Fight or Flight

Fight or Flight Group 3 Status Paper Emergency Support and Research

Presenter

Russell Uhr

Manager Production, Kestrel Coal, Rio Tinto Coal Australia

- The legal responsibilities of personnel responding to a mine emergency
- The use of diesel engines and other non approved apparatus in an emergency/special circumstances
- The minimum requirements for a diesel escape vehicle
- post incident tracking systems
- robust 2 way radio systems for use in underground coal mines
- large diameter boreholes for mine evacuations in an emergency
- Mine Emergency Management System (MEMS)
- Use of the GAG in inertisation
- SCSR simulator
- Emergency management and decision making/communications

Paper Abstracts

Fight or Flight

Performance of Personnel Transport Vehicles in high methane concentrations

Presenter

Ray Davis

Principal Engineer

Department of Mines and Energy
Simtars

Simtars under the auspices of the Queensland Mines Rescue Service (QMRS) and ACARP has been investigating the operation of underground coal mine personnel transport vehicles in non standard mine atmospheres.

Early stages of the project looked at:

- The performance of diesel engines in reduced oxygen concentrations and methane concentrations up to 4% in air.
- Development of a demonstration vehicle incorporating several features to assist the operator in negotiating a mine following an emergency.
- Trialling the vehicle both on a simulated mine roadway and in a coal mine.

These earlier stages indicated that the engines are quite useable under a variety of atmospheric conditions. However there still remained some doubt as to the ability of these vehicles to be safely operated in atmospheres following an emergency where methane concentrations above the lower explosible limit could be suddenly encountered.

This paper covers the performance testing of 3 diesel engines covering the range of engines currently used in underground coal mines in personnel transport vehicles in high levels of methane (well into the explosive range). It also covers the testing of a complete vehicle, in "as traded" condition, when mounted on a chassis dynamometer.

Legal

Having a World Class Mining Legislation is One Thing: The Effective Application of It is Another

Presenter

David Reece

Senior Consultant, The Safety Managers

Following the Moura No. 2 mine disaster in 1994, subsequent Task Group reviews and ongoing changes to Queensland Coal Mining Safety and Health Legislation (Act and Regulation) the successful application of the law is problematic. Coroner, AM Hennessey, reported in the findings into the inquest of the death of a mineworker at a Queensland coal mine near Middlemount that two supervisors had not been familiar with the requirements of the Coal Mining Safety and Health Legislation. Further, the coroner identified the risks of unqualified personnel or organisations in the development of standard operating procedures and Safety and Health Management Systems.

The rapid expansion of the industry, the change of legislation (2001), the significant increase in the use of contractors, the removal of the statutory positions of Undermanager and Open Cut Mine Manager and a shortage of Inspectors have all eroded the level of knowledge and application of the Queensland Coal Mining Safety and Health Legislation.

The use of technology, a few simple measures and a process modification can go some way to address this lack of knowledge and application of the coal mining safety and health legislation. This discussion paper presents these ideas.

Paper Abstracts

Legal

Testing for Effectiveness in Safety and Health Management Systems: A Guide to a Good Night's Sleep

Presenters

John Tate

Executive Consultant, Department of Justice and Attorney General

Ron McConochie

Safety and Health Manager, BMA Norwich Park Mine

In 1999, the Queensland Parliament introduced sweeping changes, through legislation, to the management of safety and health for the mining industry. The new legislation imposed a raft of obligations for safety and health that were grounded in both the concept of “an acceptable level of risk”, and the existence of an effective safety and health management system for all mines. However, to advance safety performance with a view to achieving a 'step-change to a safer future', this paper argues that the mere existence at a mine site of a safety and health management system does not necessarily deliver zero harm. Rather, the path to the future is a new approach.

The industry needs, as a starting point, to give an industry-wide definition and shared meaning to the concept of “effectiveness” in safety and health management. Additionally, this new approach requires a fundamental questioning of the current safety paradigm and its assumptions. The purpose then of this paper is to explore the characteristics of an effective safety and health management system from safety, inspectorate and legal viewpoints.

Legal

An Anatomy of a Death: Lessons Learned from the Davis Coronial Inquest

Presenters

Cameron Dean

Senior Associate, McCullough Robertson's Employment and Industrial Relations Group

Hayden Small

Solicitor, McCullough Robertson's Employment and Industrial Relations Group

The mining boom in Queensland has seen an increased reliance being placed on contractors to provide services on mine sites. This has lead to particular challenges in managing compliance with health and safety legislation. These challenges are brought into focus at a time when the industry's 'zero harm' goal has been marred by four deaths in 10 months.

On 21 March 2007, findings were handed down in the coronial inquest into the death of Shane Davis, a coal haul truck driver working for a contractor at the Foxleigh mine. These findings traverse some of the major health and safety challenges being faced by Queensland's expanding mining industry including:

- The management and control of contractors; and
- Training and competencies.

The shortcomings highlighted by the Coroner in the management of these aspects of safety systems must be recognised and remedied by operators, SSEs, contractors and consultants if the zero harm goal is to be realised.

In this presentation, Cameron Dean and Hayden Small will analyse what went wrong and what the industry must do to ensure that these key risks are properly managed.

Cameron Dean, senior associate, and Hayden Small, solicitor, of McCullough Robertson's Employment and Industrial Relations Group regularly act for employers in defending workplace health and safety prosecutions and advising in relation to compliance issues.

Paper Abstracts

Occupational Hygiene

Health Exposure Assessment: A 'Step Change' in Occupational Hygiene Management.

Presenter

Jack Farry

Senior Occupational Hygiene and Health Adviser, BHP Billiton Mitsubishi Alliance

In the latter part of 2006 BMA developed a Hygiene Management Plan for its Central Queensland coal mining operations. The foundation of the BMA Hygiene Management Plan was a health exposure assessment process which used qualitative and quantitative risk assessment methodologies. The process involved conducting walk-through occupational hygiene surveys, grouping workers with similar potential exposures, devising and conducting exposure sampling programs and statistically analysing the exposure data. The end result of the health exposure assessment was an understanding of the potential exposure risks faced by workers when performing various jobs and tasks. This information was then used to develop the BMA Hygiene Management Plan. Using the management plan, BMA sites are now in the process of mapping the controls currently used to manage hygiene risks. Ultimately these control maps will be used by BMA operations to identify areas for improvement and provide BMA with a 'step change' in preventative and protective occupational hygiene management.

Occupational Hygiene

Legionella Risk Management

Presenters

Dr Michael ten Lohuis

Owner-Manager, Enviro-Check Enterprises Pty Ltd.

Dr Julian Catmull

Owner-Manager, Enviro-Check Enterprises Pty Ltd.

Legionella risk management for mining operations represents a growing area of concern, particularly in view of recent published outbreaks at some northern mines. There appears to be some disparity between various OH&S and Health authorities approach to Legionella risk-management where either control measures may either insufficient, disproportionate, irrational or not relevant to the application. This is due in part to the focus of current Australian Standards for Legionella management being on cooling tower and evaporative condenser units.

That is, currently there are no common guidelines or standards that address management of other Legionella hazards identified with mining and industrial activities such as recycled and natural source waters utilized in dust-suppression, drilling, vehicle wash-down and irrigation as well as potable reticulation systems.

The context of this presentation will be based on our consulting laboratory's experience in mining and industry operations. Possible Legionella risk sources and their downstream consequences will be identified. Control strategies, system performance monitoring and risk management strategies will be discussed in relation to ensuring unified management system designed to provide the best possible outcomes as well as response times.

Paper Abstracts

Occupational Hygiene

The Influence Analytical Techniques and Uncertainties in Measurement have on the Assessment of Underground Coal Mine Atmospheres

Presenter

Darren Brady

Principal Scientific Advisor, Simtars

With the increased automated monitoring and bag sampling regimes seen in the Queensland mining industry in the past ten years it is important that the strengths, weaknesses and applicability of each technique is understood by those both interpreting and reliant on the results.

This paper will explain these and highlight how slight variations in measurement can have a significant impact on commonly used indicating ratios and calculations rendering them unreliable. This is particularly the case for Graham's ratio calculations determined for areas of minimal oxygen deficiency, including return airways for which there is a requirement in the Queensland Mining Regulations to do so.

The need to perform a complete analysis by gas chromatograph of potentially flammable atmospheres generated during coal fires or heatings will be explained. Failure to do so can lead to wrongly assessing the atmosphere to be inert, when in fact it could be explosive or fuel rich due to the generation of percent levels of carbon monoxide and hydrogen.

Health

Addressing the Health of an Aging Workforce

Presenters

Sheree McKenzie

Health and Wellness Services Manager, Wesley Corporate Health

Fiona Rosenberg

Occupational Health and Safety Advisor, BHP Billiton Mitsubishi Alliance

Dealing with health can be expensive. With Australia spending some 8% of GDP on health services it is important in a preventative health program that we focus on the health risks in the workplace. The goal should be to improve individual employee health and provide a return on the health investment of the employer. The working age of individuals is increasing and as a consequence so is the susceptibility to a range of health risks.

Cardiovascular Disease (CVD) is responsible for nearly half of all deaths in Australia. It's also responsible for 1 in 4 men over the age of 40 retiring prematurely.

Cancer accounts for approximately 25% of all deaths in Australia. While prevention is the key to minimising cancer risk, early detection is essential for treatment.

Mental Health Twenty percent of Australian's have experienced a mental health event (in particular stress, anxiety and depression) within the past 12 months.

Diet, Exercise and Lifestyle are primary behaviours that contribute to a range of health and medical problems.

Lifestyle Choices of smoking and excessive alcohol consumption are contributing to poor health.

Asthma, Migraine and Back and Neck Pain are significant causes of time away from work and lost productivity.

Wesley Corporate Health (WCH) specialises in the development and delivery of a wide range of preventative health programs to organisations across Australia. With more than fifteen years experience, we have established an outstanding record for tailoring health programs that meet the company's specific needs and objectives as well as the needs of the individual.

WCH has teamed up with BHP Billiton Mitsubishi Alliance (BMA) to develop a sustainable employee health promotion program. BMA recognises that employees perform best when they are healthy, and that optimal employee performance is

necessary for the company to be a leader in its field. With the average employee age on the rise this is becoming more and more important.

The point of difference for the BMA Health Program is a consistent approach to the management of health issues. Each mine site has an annual KPI to conduct a health needs assessment with at least three subsequent health initiatives to target the main health risks identified. Health promotion is now imbedded in the BMA business core values and performances indicators. Some of the initiatives that sites are doing are health assessments, influenza vaccinations, skin checks, cancer awareness sessions, quit smoking programs, 10,000 steps program, etc.

The aging working force is an ideal environment for behaviour change. It is a maturing culture. The average employee recognises they are not as invincible as they once perceived themselves to be and their elders are experiencing health problems that they themselves do not want to experience. This is the right time and environment for workplace health promotion to be successful.

Health

Functional Testing is a Validated Step Toward a Safer Workplace

Presenter

Jenny Legge

Managing Director, Jobfit System

Functional testing is a validated step toward providing our workers with a safer workplace. An ACARP funded research project at a Queensland coal mine identified a statistically significant relationship between performance in a pre-employment functional assessment and back and shoulder injuries from manual tasks. During the period from December 2002 to January 2007, 62 workers reported 91 injuries at the test site. The relative risk of reporting a back, shoulder or trunk injury from manual tasks by workers who had a mismatch between worker capabilities and job demands was 3.56. A relationship was also found between performance and length of employment. The full results will be presented and discussed.

A step-by-step process for implementing and monitoring functional testing programs based on research and experience will also be presented. The importance of implementing such programs as only a single step along the path to a safer workplace will be one of the key messages.

Paper Abstracts

Health

Workplace, Alcohol and Other Drugs - More than Managing the Risk

Presenter

Chris Parker

Health and Well-being Advisor,
Golding Contractors

How does the mining industry adapt itself to face the challenges of a society? If we as a society are unable to solve the issue of Alcohol and Other Drug (AOD) use with drug related crime, alcohol related violence, road vehicle accidents, and insufficient treatment providers then how can we as an industry address the legal ramifications of someone being in possession of an illegal substance on our mine site, alcohol behavioral and performance related issues, fatigue, and management of our workforce. What is our motivation? Is it the cost to industry being estimated at up to 13.7 billion per year? The 7.5 million lost work days? Is it liability extending outside the workplace? Is it the requirements to identify and manage risks, the estimated 25% of injuries and 10% of deaths? Or is it our sons and daughters experiencing these same issues? At GOLDING CONTRACTORS PTY LTD we have combined all these into a holistic approach. Combining OHS, HR, and Community Services, GOLDING has provided a support program that has educated 100% of the workforce and over 70 people have gone on to further information or treatment. Comparatively that would be 177,000 people in the population of Brisbane.

Diesel Particulate Matter

Mine Real Time Personal Respirable Dust and Diesel Particulate Matter Monitoring

Presenters

Stewart Gillies

Director, Gillies Wu Mining Technology Pty Ltd.

Hsin Wei Wu

Director, Gillies Wu Mining Technology Pty Ltd.

Two new developments in mine atmospheric monitoring approaches are highlighted.

A new personal respirable dust monitor (PDM) that gives realtime readings will be discussed. The unit is mounted within the miner's cap lamp and internally measures the true particle mass of dust collected on its filter. Samples are available for later mineralogical analysis and results do not exhibit the same sensitivity to water spray as optically based measurement approaches. The technique achieves microgram-level mass resolution even in the hostile mine environment and reports dust loading data on a continuous basis. The monitor is being adopted for statutory mine respirable dust determinations in the US. It has particular application for determining high source locations and efficiency of engineering means of suppression and other approaches to handling the problem.

It has been recognised that the PDM's unique measurement approach has application to allow real time atmospheric Diesel Particulate Matter (DPM) monitoring. The industry has no real time atmospheric DPM monitor at present. Recent shift average surveys in Australian mines show significant numbers of miners continue to face full shift DPM exposures in excess of internationally accepted levels. Real time DPM monitoring will allow the industry to pin-point high exposure zones such as those encountered at extraction and transfer points where a number of vehicles work or in areas of poor ventilation. Pinpointing of high DPM concentration zones will allow efficient modification of work practices to reduce underground miners' exposure.

Some outcomes from mine tests with both these new instruments will be discussed.

Paper Abstracts

Diesel Particulate Matter

Diesel Particulate Matter in Underground Mines: Controlling the Risk

Presenters

Kevin Hedges

Principal, Occupational Hygienist, North Region Safety and Health, Department of Mines and Energy

Fritz Djukic
Senior Principal Occupational Hygienist, Department of Mines and Energy

G. Irving
Department of Mines and Energy

The Queensland Government Department of Mines and Energy acknowledges that diesel particulate matter is a likely carcinogen. Underground miners are at risk of being exposed to diesel emission. In line with sound risk management practices, this hazard must be assessed and the risk be controlled to an acceptable industry standard.

An industry occupational exposure standard of 0.1 mg/m^3 measured as submicron elemental carbon (EC), first proposed by the NSW Minerals Council in 1999, has now been recommended by the NSW Department of Primary Industries "Guideline for the Management of Diesel Engine Pollutants in Underground Environments MDG 29 (Draft 22 November 2006)". BHP Billiton have adopted 0.1 mg/m^3 EC and the Australian Institute of Occupational Hygienists (AIOH) have published "A Guideline for the Evaluation and Control of Diesel Particulate in the Occupational Environment". This guideline refers to the Minerals Council exposure standard of 0.1 mg/m^3 EC. There is now an industry exposure standard, a method to assess personal exposure to element carbon (NIOSH 5040) and methods to measure the concentration of diesel particulate matter in the raw exhaust.

Considerable research has been carried out in Australia since the 1980's evaluating control technologies to reduce emission. Based on previous research, new technology and guidance material, being made available to Industry, the Department of Mines and Energy considers that there is now sufficient guidance material for industry to comply with the industry exposure standard of 0.1 mg/m^3 EC. This paper will concentrate on controlling the risk. In particular it will discuss the latest control technologies in engine type. It will also discuss the importance of fuel quality, with an emphasis on lower sulphur fuel and alternate fuels such as bio-diesel.

It will also emphasize the importance of having a systematic approach to preventative maintenance and implementing a diesel emission based maintenance program.

The paper will also discuss the current status of diesel emission management in Queensland coal and metalliferous underground mines.

Diesel Particulate Matter

Controlling Diesel Emissions in Underground Mining Within an Evolving Regulatory Structure in Canada and The United States

Presenter

Sean McGinn

President, McGinn Integration Inc., Montreal, Quebec, Canada

Since the mid-1990's the reduction and control of diesel emissions in underground mining has received considerable focus in Canada and the United States. In March 1995 the American Congress of Governmental Industrial Hygienists (ACGIH) proposed a TLV of 0.15 mg/m^3 for diesel particulate matter. This proposed TLV served as a catalyst to the mining industry in terms of mining regulators looking at proposing significantly lower regulated limits for DPM and mining operators seeking technology and solutions that would allow them to achieve these reductions.

In 1996 the Diesel Emissions Evaluation Program (DEEP) was formed from this catalyst to address the concerns. DEEP was a consortium formed between industry, regulatory, labour, research and manufacturing sectors in mining. The project mandate of DEEP was divided into three main project focus areas, measurement methodology, emissions reduction technologies, and measurement use and management. Since the completion of the DEEP research projects there has been a continued thrust towards lower regulated limits for DPM particularly in the U.S., and technologies that allow mine operators to achieve them.

This paper will discuss the changing landscape of emissions regulations in Canada and the U.S. and what mine operators are doing to achieve compliance. The projects that tested concepts for emissions reduction technologies in DEEP have since moved beyond to more innovative methods and technological advancements and the new challenges that come with them. Engine technology has seen many changes in recent years to achieve compliance within global regulations such as U.S. EPA Tier II and III and creates questions for mining operators in terms of how to choose the best technology for the application. Emissions control technology such as the latest developments in diesel particulate filter (DPF) systems offer some of the best possibilities for DPM reduction but often confront users with as many challenges as there are opportunities. In the end the most important emissions reduction technology remains maintenance at the source of the problem. Mine maintenance departments are presented with ever more complex problems to deal with in terms of keeping the new technology diesel engines and emission control systems operating efficiently and reliably. To achieve this they are looking towards spending considerable effort in learning the use of new diagnostic tools and better techniques and keep the balance between the cleanest possible technology and mine production and profitability.

Paper Abstracts

Miscellaneous

Cyclone George: Lessons for Queensland: Is Your Operation Ready for a Cyclone George?

Presenter

Kade Greenwood

Senior Consultant - Crisis Preparedness, Rowland

The destructive power of cyclones is well known to Australia, yet the devastation caused by Cyclones Larry and George have left a lasting impact. Queensland is home to a significant number of mining operations within the cyclone region and it begs the question, are we really prepared? Recently, a mine site in Western Australia was hit by the full force of a cyclone, stressing the difficult yet vital decisions faced by mine managers under such circumstances. A range of issues need to be considered by mine managers while under intense pressure and with limited time, including:

- The decision to evacuate; when and by whom
- The logistics required to conduct an evacuation, particularly when commercial transport is unavailable
- How staff can be protected on-site
- What, if any, site services should be available following a natural disaster.
- If we consider the operational and commercial impacts the list grows considerably:
- The logistics required to return staff to work
- Aspects of repair and recovery
- Contractor relationships
- Infrastructure damage and subsequent supply chain disruption (transport interruptions and port closures).

Cyclones and other natural disasters represent a real threat to mining operations in

Queensland and the cost of being unprepared can be devastating.

Be prepared and start planning now.

Miscellaneous

Properly Identifying Causality Factors in an OHS Incident is a Step Closer to "Zero Harm"

Presenter

Harold Downes

Partner, Freehills Australian Law Firm

The primary objective in any post incident investigation and ICAM reporting should not be to assign blame, but to identify causes with a view to preventing a recurrence. Identifying the real cause or causes in an OHS incident can be a complex process. However, the careful identification of causes in post incident investigations and ICAM reporting is crucial to achieve a goal of zero harm for all mine workers.

This presentation will explore the issues involved in identifying and reporting causal versus non causal issues following an OHS incident to move towards a safer future for miners.

Paper Abstracts

Miscellaneous

Fitness for Duty in the Mining Industry: A Legal Perspective

Presenter

Ian Humphreys

Partner , Blake Dawson Waldron

Health and safety legislation in the Queensland mining industry requires the development and application of fitness for work programs so that risks arising from drugs and alcohol and fatigue are eliminated or controlled.

By reference to case law examples, this paper will identify how participants in the mining industry in Queensland and other States have approached fitness for work. This will include considering questions such as:

- What have been the key legal issues?
- What approach have the courts taken?
- What general rights do operators have to implement fitness for work programs?
- What issues have unions raised relating to such programs?
- What are some of the important underlying medical and scientific issues?
- What are some of the lessons for mining operations in managing fitness for work programs going forward?

The paper will also consider fitness for work in comparable industries which may be helpful for the mining industry.

An understanding of the above issues and approaches will assist mining industry participants to effectively develop and manage fitness for work programs which encourage all people at work to think differently about, and challenge, how they approach these matters. This in turn can improve safety performance, reduce legal liability and provide skills which people can use in all areas of their lives.

The paper will be designed to transfer important knowledge from the authors/presenter to conference participants.

QUT Workforce - Health Issues

Health Status as a Risk Factor for Safety: Towards Closer Integration of Health and Safety

Presenter

Professor Tony Parker

School of Human Movement Studies & IHBI, Queensland University of Technology

There is increasing interest in improving the health of the mining workforce through a range of health promotion strategies. The challenge is to effectively integrate health promotion strategies with our traditional safety procedures. For example, relatively high levels of overweight and obesity in the workforce have implications not only for development of chronic diseases but also for workplace safety and injury. Combining the safety and health promotion programs would be more cost effective, but would also require new training programs for those skilled in either safety or health promotion. The emphasis on safety suggests that traditional interventions may be less effective when dealing with health than when dealing with safety. To be effective in these processes the industry needs a clear evidence base on which to improve its practices and new health indicators and norms will need to be developed to measure health outcomes. Additionally, the incorporation of positive health indicators into health and safety reporting procedures is essential, rather than a general reliance on simplistic 'safety lag indicators' such as lost-time injuries. This presentation will review research concerned with the health of the coal mining industry and identify some needs and possible solutions to more effectively integrate health with safety to reduce the incidence of injury and work related illness.

Paper Abstracts

QUT Workforce - Health Issues

The Utility of a Recovery Heart Rate as a Predictor of Cardiovascular Health

Presenter

Dr Ian Stewart

School of Human Movement Studies & IHBI, Queensland University of Technology

During physically demanding activity or work, heart rate increases to meet the elevated energy requirements placed upon the body. Following the cessation of the activity the heart rate rapidly declines. The time course of this recovery (or kinetics) can provide immediate feedback on the intensity of the preceding work, the individual's physical fitness, and also a reflection of the individual's cardiovascular health. For example heart rate responses recorded during simulated mining tasks i.e. incremental carry, coal shovel, and hose drag that require an intense all-out effort are not able to discriminate the actual demand placed upon the individual as heart rate quickly reaches a maximum and plateaus (180, 184, 183 bpm, respectively). However monitoring of heart rate kinetics following the cessation of activity clearly discriminates the hose drag as the most physically demanding task (+7 bpm at 60 seconds post activity). Comparisons between individuals of differing age and gender can also be undertaken with faster heart rate recovery indicating a higher level of physical fitness. While substantially delayed heart rate recovery following exercise, or slowed kinetics, has also been shown to be a powerful and independent predictor of mortality.

QUT Workforce - Health Issues

The Utility of Strength Measurement in the Prevention of Musculoskeletal Injury

Presenter

Dr Michael McDonald

School of Human Movement Studies, Queensland University of Technology

Strength measurements are commonly incorporated into injury prevention and musculoskeletal screening protocols but the predictive value of these measures is inconclusive. This may reflect the lack of specificity in the use of the measurement protocols and the lack of a strong relationship between the particular strength measure and the functional requirements of the particular work tasks. In the area of vertebral injury, increases in the strength of back muscles has not been shown to be a strong predictor of injury and alternative mechanisms such as decrements in muscular coordination and muscular endurance may provide more promising results. These changes may reflect peripheral fatigue in the involved muscles and the characteristics of the particular work task. The role of strength assessment with respect to fatigue and the influence of shiftwork, particularly in the mining setting, has not been examined and may be useful in determining recovery following work of high intensity and duration. This presentation will provide an overview of our research in the mining industry in the area of strength measurement and elsewhere to indicate the predictive value of strength measurement. Suggestions for the application of strength measurement protocols which may be used in the prevention of musculoskeletal injury will also be discussed.

QUT Workforce - Health Issues

Heat Stress in a Changing Workforce

Presenter

Andrew Hunt

School of Human Movement Studies & IHBI, Queensland University of Technology

Both surface and underground mining operations expose workers to considerable heat stress. In such an environment worker health can become compromised from lapses in concentration leading to injury, or from an increase in core body temperature and dehydration causing heat exhaustion. The guidelines of the International Organisation for Standardisation and the Australian Heat Stress Standard focus primarily on the environmental factors producing heat stress. Engineering and administrative controls are suggested to maintain the climatic conditions within an acceptable level, in which the majority of workers should be safe to work in. However, this leaves a small portion of the workforce still at risk of heat illness. Workers who are likely to fall into this category are those who are older, overweight, and of low physical fitness. It is widely known that in the western world the workforce as a whole is aging. In addition, research has noted that the average miner in Queensland is overweight and of low to moderate physical fitness. If the Queensland mining industry is to meet its goal of "zero harm" for all mine workers these factors will need to be considered in future guidelines.

QUT Workforce - Health Issues

Issues and Opportunities Associated with the Recruitment of Women to the Mining Workforce

Presenter

Radka Dufalova

IHBI, Queensland University of Technology

Skill shortages in the mining industry has stimulated the increased recruitment of women into the workforce and although numbers are limited at this time they are working in positions traditionally occupied by men. A major challenge is to ensure that the work and work tasks given to this population group is consistent with their physical and psychological capacity. Failure to do so increases the possibility of work-related injury or illness and associated costs to both the individual and industry.

In spite of increasing automation physically demanding work is common in mining in addition to long working hours and shiftwork. There is increasing evidence of the association between these work conditions and musculoskeletal disorders and the health of males in mining, however, similar information concerned with the female workforce is not available. Consequently opportunities to implement injury and health risk profiles and controls for females is based on known gender differences in functional capacity in the general population and experience from other industries. Specificity in the appropriate matching of the functional capacity of women with the physical and mental demands of mining tasks is limited. This presentation will review the available information in this area and discuss the issues involved in developing the appropriate strategies and procedures that should be considered in reducing the risk of injury and other adverse health conditions in the female workforce.

Paper Abstracts

Safety Culture

Ownership of Behavioural Safety in a Transient Workforce

Presenter

Mick Crowe

Chief Operating Officer, G&S Engineering Services

Improving minesite safety involves both permanent mine site and contractor workforces, with the later having the challenge of less permanent and in some cases transient staff. Irrespective of employer, the need is for all staff working at a mine site to demonstrate the same standard of safety behaviour. The steady improvement in safety performance in the mining industry has ensured that progressively advanced safety management processes are required and need to be absorbed into the workforce. To drive down Recordable Injuries frequencies, it is essential that there is greater commitment from all of us in the industry to avoid the lowest levels of risk. Systems and supervision will not be sufficient to make a worker think all day every day about the risks in their workplace, and ownership of behavioural safety is the vehicle to foster this ownership in the individual. To achieve the industry safety goals we must have ownership of behavioural safety, not only in our permanent workforce but also in the transient workforce that exists with contracting labour at this time. The answers to achieving ownership of behavioural safety are not simple and they rely on the basics of owning your people and their issues, and asking for the same from them in return. This presentation expands on the difficulties encountered and successes achieved in driving behavioural safety in a major contracting organisation which are the same challenges facing everyone in the industry in supporting this vital process.

Safety Culture

Achieving Enduring Change: Developing a Positive Safety Culture

Presenter

Kieren Moffatt

Organisational Psychologist, Prospect Consulting Group Pty Ltd

Developing a positive safety culture requires a shift in thinking about what sustains changes in behaviour over time. Currently, safety initiatives often focus on the individual to think and behave more safely through participation in training courses (e.g. behavioural safety courses, safety leadership initiatives) or through system implementation (e.g. safety observation procedures). However, changes in behaviour are often short term as members of these training courses and initiatives find themselves back in a workplace that does not support these new behaviours. We propose an alternative, system-level approach to developing a safety culture that ensures commitments to safe behaviours made by the broader workforce are actively supported by the system they work within. System-level change is achieved through: clarification of safety in the organisation or site value hierarchy by senior leadership based on data collected from the broader workforce, communication of key safety messages through existing formal and informal channels, translation of core safety values and messages at each level of the organisation into leadership behaviours, and commitment of the broader workforce to behaviours in line with the new safety culture through a genuinely participative change process. Consistency between values and behaviours is the aim, zero incidents the intent.

Paper Abstracts

Safety Culture

The Road to a Total Safety Culture

Presenters

Roy Tindale

Compliance Superintendent, BHP Billiton Mitsubishi Alliance, Norwich Park Mine

Lincoln Elridge

Consulting Psychologist, Sentis Pty Ltd

A priority for all mining companies is the pursuit of zero harm for their people. Traditionally this pursuit has utilised Behaviour-based Safety (BBS) systems and has achieved results of varying success.

The Mining industry is well documented within the safety literature for traditionally employing BBS systems as provided by companies such as DuPont (Canada) and Dr. Scott E. Gellar's company Safety Performance Solutions (USA).

These companies have primarily incorporated components of BBS systems such as engineering, in addition to policies and procedures. Companies that have been brave and honest enough to conduct genuine assessments of their continuing safety performance have recognised that the early gains made through BBS are slowing and, in many cases, have reached plateaus.

This is due to the limitations of the theoretical foundations of BBS, that is, Behaviourism. Behaviourism and the BBS model assume that external motivators are required to have employees behave in certain ways, therefore behavioural theory does not take into account a fundamental human aspect - that people think and feel independently of the inconsistent reward/punishment systems set up in a BBS system.

A successful response to the challenges inherent in the BBS systems is Cognitive Behavioural Safety (CBS). Drawing upon the psychological theory of Cognitive Behaviourism, CBS recognises that an individual's behaviour is a function not only of external influences and consequences but is also guided by internal attitudes, values, and belief systems. In particular, CBS is the combination of the psychological theory of Behaviourism, the foundation of BBS, and Cognitive Psychology -- the psychology of how people think and feel. By combining these two psychological theories into CBS and applying them to safety within the mining industry, they have been observed to create a genuine opportunity for dramatically improving an individuals' ability to keep themselves safe. Dr E. Scott Geller has himself stated that '...behaviour based safety (BBS) programs, taken alone, cannot be effective unless the workforce believes in and willingly applies the principles of the BBS program. To achieve a true Total Safety Culture and Zero harm for employees it is necessary to integrate both behavioural and person-centred approaches to safety.'

Technical

Advance Mining Technologies

Presenter

Greg Rowan

Director Mining Research, CSIRO Exploration and Mining

Applications of advanced technologies are an integral part of mining safety management in Australia. The Australian coal industry has led the world in the development of these technologies in association with research organisations, universities, state and federal governments, mines inspectorates, mining companies, unions, equipment suppliers and rescue services.

Australia has developed leading technologies in the following areas:

- Development of new instrumentation to measure rock and coal properties in-situ
- Automated, cost effective, accurate 3D mapping and monitoring through digital photogrammetry
- Structural modelling for blast optimisation, fragmentation analysis, drill core profiling and real-time input into mining operations
- Seismic and micro-seismic techniques for understanding and predicting rock failure mechanisms and windblast warning systems
- Autonomous roof bolting techniques
- Fires and explosions - prevention and control technologies gas characterisation, content and emission prediction, outburst mechanisms
- Coal bed methane wells and longwall goaf gas drainage
- Automation technologies: surface (Dragline Swing Assist, Digital Terrain Mapping) and underground (Longwall automation, horizon control, retreat measurement
- Advanced mine communications, personal location and two-way paging systems

As the Australian mining industry strives to achieve its “zero harm” target, further technological developments and applications will be critical as we seek to remove operators from hazardous environments and increase the consistency and reliability of production.

This paper will detail the application of advanced technologies in the Australian mining industry, explore the future of technological developments and challenge the audience with the obstacles to be overcome in achieving the mines of the future.

Paper Abstracts

Technical

Earthmover Tyre and Rim Related Accidents and Incidents: A State of the Art Review with Recommendations

Presenter

Tilman Rasche

Manager, Risk & Business Improvement, Klinge & Co.

Earthmover tyre, rims and wheel assemblies are safety critical items which must be maintained and operated correctly to provide a safe working environment.

Unfortunately less than adequate awareness of 'off the road' (OTR) tyre and rim related hazards, and lack of application of correct and proven approaches to deal with these hazards, in both the maintenance and operations areas continue to cause tyre and rim related accidents and incidents across the industry, some of them fatal as demonstrated by at least 6 fatalities in the Australasian region over the last few years. Even near misses, when properly assessed for their true risk potential can often be classified as 'high potential' events. Working with OTR tyres and rims has gained additional significance due to the global earthmover tyre shortage in that tyre owners and managers are required to consider not only higher frequency tyre maintenance (and therefore exposure to tyre and rim related hazards), but also use 2nd hand, repaired or retreaded tyres, or tyres of untried performance which have created a new set of hazards unknown to most tyre servicemen.

This paper and presentation provides a state of the art review of 83 tyre and rim related incidents and accidents and presents key findings and necessary recommendations for adoption into industry safety, maintenance and operations management systems that will make working with tyres and rims safer.

Note: this presentation and paper is based on the 2006/2007 ACARP project - C15046 Review and analysis of tyre related accidents and incidents, a study with recommendations to improve tyre and rim maintenance and operational safety of rubber tyred earthmover equipment.

Technical

Managing Vibration Exposure

Presenters

Gary Foster

Foster Enterprises Industrial Health and Safety Training

Maria-Jose van Leeuwen

Foster Enterprises Industrial Health and Safety Training

Whole-body vibration exposure is found to be associated with low-back injuries and gastrointestinal disorders. Muscular fatigue and stiffness may lead to re-occurring pain. Hand-arm vibration exposure can lead to injuries to wrist and arm joints as well as vascular problems, including vibration white finger. Vibration exposure is an emerging issue for Australian mines and needs to be managed properly with full knowledge of all controls available.

The current Australian Standard for whole-body vibration describes measurement and assessment methods and provides exposure limiting guidelines. The assessment of jolts and jars is addressed for the first time. The EC has also released exposure limits and action levels.

There are a number of solutions available for reducing vibration exposure. Ideally these solutions should start with control at source, but this is not always possible. Vibration exposure can be reduced using a combination of methods, including modifying vehicles, work procedures and operator training. These treatments can also have productivity benefits. Correct seating design is important and depends on the character of the vibration exposure. Expensive air ride suspension seats are not always the best control method and can sometimes even exacerbate the problem.

This paper will discuss a managed approach to assessing and controlling vibration exposure issues in mines.

Wellness

The Silent OH&S Risk 'Chronic Diseases': Do you have a Minefield of Employees? Which one is waiting to Detonate? Will Others be Affected?

Presenter

Annette Zeman

Dietician, Corporate Nutrition Solutions

Chronic diseases are the silent OH&S risk. Employees are silently developing risk factors for cardiovascular disease, obesity, high blood pressure and Type 2 diabetes.

An ageing workforce, and a skills shortage faced by many industries, is making the issue of employee health more pressing for employers.

Employers are becoming increasingly engaged in the health of their employees to be socially responsible and improve company performance (1). Employees that are happy and healthier, are known to be fitter for work, less likely to be absent from or injured at work and more productive (2).

Poor nutrition is a known risk factor for the development of these chronic and life-threatening diseases (3). Nutrition education is crucial to preventing and treating cardiovascular diseases, diabetes and pre-diabetes, overweight and obesity, and high blood pressure.

This paper will provide conference delegates with insights into what types of intervention programs are evidence based and achieve sustainable changes in employee health.

Reduce the minefield! Diffuse the bombs, reignite with a health lifestyle supported by the worksite

Wellness

The First Step in Measuring the Effectiveness of a 'Wellness' Initiative is to Perform a Needs Assessment

Presenter

Leanne Scanes

Managing Director, Corporate Bodies International

In Australia, Workplace Health Promotion (WHP) has a long history, but due to very few successful and validated outcomes, its implementation to date has tended to be patchy and any reductions in health care costs mean little to employers because there is no immediate cost benefit realized.

While organizations are still grappling with issues such as absenteeism, worker fatigue, stress and burnout, the focus of WHP initiatives has changed from early models of providing employees with exercise facilities and medical checkups, to a more holistic approach which entails providing individuals with health education, lifestyle modification, behavioural change and self-management interventions.

The key to addressing the growing number of risks and issues in the occupational health area is for organizations to develop and implement an overall business strategy that addresses the three key factors impacting on workplace health; organizational structure, physical environment and individual behaviour.

A critical process in achieving optimal change is for organizations to invest time and resources to perform needs assessments in order to identify where problems and potential high risk areas exist, how big the problems may be, and where attention should be directed to address the problem. Only then can effective occupational health strategies and workplace health promotion programs be put in place.

This paper provides practical solutions to assist organizations in performing needs assessments to diagnose where their organization is at greatest risk people-wise, program-wise, or expense-wise. Through case studies, we will also show how the outcomes of these needs assessments can be translated into effective WHP programs that improve the health of employees and reduce employer costs.

Paper Abstracts

Wellness

Be More Active Moranbah: An Innovative Local Partnership Linking Community Health Promotion Strategies with the Mining Workplace

Presenter

Kathryn Short

Senior Health Promotion Officer, Queensland Health

"Be More Active Moranbah" (BMA-M) is a three year project designed to promote health and well-being by increasing physical activity levels in BHP Billiton Mitsubishi (BMA) employees and the broader Moranbah community. The project is the result of a partnership forged between BHP Billiton Mitsubishi Alliance Broadmeadow, Goonyella Riverside and Peak Downs mines and Queensland Health.

Launched in March 2006, the project has been designed to align strategies within the community and workplace settings using a multi-level ecological approach to address barriers to physical inactivity. Strategies implemented to date are the 10,000 Steps Moranbah Library Pedometer Loan Scheme, the media strategy, environmental change strategy as well as a Primary Health Care Brief Intervention.

Workplace health promotion programs have been reported to have numerous benefits including the potential to improve health, employee well being and morale, productivity, job satisfaction, work-related self-esteem and ability to cope with work-related stress. However, there are difficulties in engaging participation in workplace programs from subsections within the workplace.

Heavy industry and blue-collar workers are a priority target group for improving health given their higher incidence of unhealthy behaviours such as smoking, alcohol consumption poor nutrition and physical inactivity. This target group are also less likely to present to their general practitioner than the general population placing them at a higher risk of early disease markers going undetected. They are also a notoriously difficult group to engage in workplace health promotion strategies. By combining community based health promotion with workplace based strategies it is anticipated that this project will be more successful in engaging participation from this priority group and therefore better health outcomes.

Site

Shutdown Contractor Management at the Xstrata Copper Ernest Henry Mine

Presenter

Gary Perkins

Training Co-ordinator, Concentrator, Xstrata Copper

Ernest Henry Mine (EHM) Concentrator has four planned maintenance shutdowns per year; these occur in February, May, August and November and are aligned with reline requirements for the Semi-Autogenous (SAG) Mill.

As part of this shutdown process, a large influx of short term labour ("contractors") allow the completion of much larger workloads than would otherwise be possible with the smaller permanent work crews. For this reason it is crucial that a proactive and systematic approach be taken to the management of contractors to enable EHM to achieve a successful shutdown. The EHM definition of a successful shutdown incorporates 3 key components:

- Safe completion of all tasks
- Environmentally responsible behaviours of all personnel; and
- Timely completion of tasks within the allocated budget

There are a number of tools used to facilitate the above objectives, however this abstract focuses on the key areas required for the safe completion of all tasks:

- Communication - Establish a clear and open line of communication for all parties involved by holding meetings regularly leading up to the shutdown.
  - Establish ground rules, expectations and scope of works prior to each shut down.
  - At these meetings the major contractor is in attendance.
  - Individual discussions with each of the EHM "host" employees to ensure delegated tasks are clearly understood allowing a Job Safety Analysis (JSA) to be completed.
  - Time lines and critical path established. This is an important part of the process as it provides a full understanding of work required and how long is available to carry out the work safely.
  - Hold meetings twice daily during the shutdown to discuss safety, environment, critical path activities and all other maintenance areas in general. This is done at the crew level and at a management level to ensure issues; hazards and incidents are communicated to all personnel.
  - Accommodation confirmed and caterers notified nothing makes for an unhappier workforce than poorly organised accommodation!

- Contractor sends Qualifications for all employees e.g. OH&S ticketing for verification and recording.
- Contractors attend a shut down orientation session; this covers inductions, general site rules, JSA's, and any other safety aspects that need to be implemented or considered.

- Supervision - On average, total employee numbers increase by more than 4 fold (120-140 contractors) and effective supervision by "EHM knowledgeable people" is critical
  - EHM Crew members become "hosts/knowledgeable people" (similar to a supervisor of a group of contractors) for each job; this allows the Supervisors to concentrate on the overall picture creating less confusion. E.g. priority of jobs, group lockouts and any unplanned issues arising.
  - JSA's are reviewed by not only the host and workers but also by EHM and Contractor management personnel.
  - Safe work observations and permit audits are assigned to each supervisor.
  - Designated personnel are assigned to ensure correct group isolations are in place and permits (confined spaces, hot work, etc) are completed correctly.
  - Positive reinforcement is encouraged - It doesn't hurt to thank some one for a job well done.
  - Fit for Work testing is completed daily including blood alcohol content (BAC) by all personnel and random drug testing. In addition fatigue assessments are completed as appropriate.
  - Designated safety officers (EHM and contract) assist hosts and supervisors to ensure work activities are conducted safely
  - All height safety and lifting equipment is tested and tagged prior to the shutdown, this equipment is colour coded to confirm testing is current.
  - Pre start inspections are required to be performed on equipment prior to use.
- Review (Did Well/Do Differently)
  - Permit Audit reviews are undertaken to identify key learning's or areas for further training.
  - Safe work observations are reviewed, follow up's and corrective measures implemented as required.
  - Any incident reports are reviewed. Note: All incidents are encouraged to be reported no matter how minor in order to identify opportunities to prevent a re-occurrence. A "no blame" culture is strived for.
  - All findings are released to crews and control measures implemented as required
  - Contractor Management attend a post shutdown meeting
  - All crews attend their own post shutdown meeting, and any issues raised are elevated to the management level so actions can be put in place for continuous improvement.

Site

Maintaining a "Step Change" Approach in Health and Safety: The Commodore Mine Experience

Presenter

Peter Newman

Executive General Manager, Health, Safety and Environment, Downer EDI Mining.

The Commodore Mine operated by Downer EDI Mining has achieved many industry best practice measures including life of mine lost time injury free performance, in the 6 years of operation, Queensland industry safety awards. Environmental awards, low levels of turnover and high levels of employee involvement. What have been the success factors that have achieved this result in Health and Safety Management? The starting point was far from the ideal, or was it?

The client was a power station operator, new to the industry and not a coal miner. The Operator and SSE was the contractor, new to the coal industry in Queensland, the site was starting from scratch, on the doorstep of the regulators and under the spotlight. New industrial agreements and new mining methodologies were being introduced to provide a competitive advantage in the marketplace. Changes in the approach to Health and Safety management were critical to the success of the project.

Six years on, the journey to maintain continuing step changes in achieving excellence in Health and Safety performance presents a challenge that continues to be met at the Commodore Mine. The paper outlines the challenges, the approach, and the results of maintaining a step change approach, year in year out, to achieve sustained industry best practice performance.

Site

Information: The Achilles Heel of Emergency Response

Presenter

David Cliff

Associate Professor, Minerals Industry Safety and Health Centre, Sustainable Minerals Institute, The University of Queensland

Information is the issue that has been managed worst during level one emergency response exercises in Queensland. This is also true of the author's experience during actual significant incidents. Recent events in the USA particularly at Sago Mine mirror this.

The parts of the reports from the exercises relating to information collection, analysis, display and dissemination read with remarkable consistency and uniform inadequacy. The recent fight or flight seminar in Emerald laid great stress on rapid response but how can you respond if you do not know what is happening? Or who is underground and where? Or what resources you have?

One key flaw in emergency response is that the systems we employ during the emergency are only used during the incident or during rare practises. Personnel are therefore not familiar with the techniques and processes. It is essential that the everyday systems are employed in emergencies.

We live in the 21st century. It is about time we applied 21st century techniques to emergency response.

This paper will explore the information needs during an emergency, the ways to optimise the collection of the information, and ways to effectively disseminate the information. Types of information dealt with include not only the mine environment but also personnel location, witness testimony and the status of the incident.

Contents

Innovations

Pin Stopper for PC1100 Boom Arm Pins
Rio Tinto Aluminium Weipa

The Problem

Hazard/s innovation targets: Pins falling and working at heights

This innovation was introduced into the East Weipa Heavy Equipment Workshop. A diesel fitter was assigned the task of removing an arm cylinder, which is located five5 metres above ground level on the boom of an Excavator. Prior to removal of the cylinder, two 98kg pins holding the cylinder in place must be removed. This requires 2 people working in close proximity on separate elevated work platforms (EWP). One person on one side of the boom using a sledgehammer to hit the pins out whilst the other person on the opposite side of the boom, is waiting to try and stop the pin's movement once it has been dislodged. Two overhead cranes were required; one to hold the cylinder and the other, to hold the pins (Figure 1).

The diesel fitter responsible for completing this task, stopped the task after conducting a risk assessment which identified the following hazards:

- The 98kg pins could very easily shoot out of the boom, either landing in the elevated work platform, fall 5 metres to the ground or strike the second worker involved.
- The amount of grease on the pin could cause it to easily slip from the sling whilst suspended by the overhead crane.
- Person stopping the pin from falling is in a *red/danger zone*. This worker had restricted movement in the EWP.
- The size and distance the pins could fall, would generate large amounts of force

resulting in injury to a person and damage to the floor or anything it contacted.

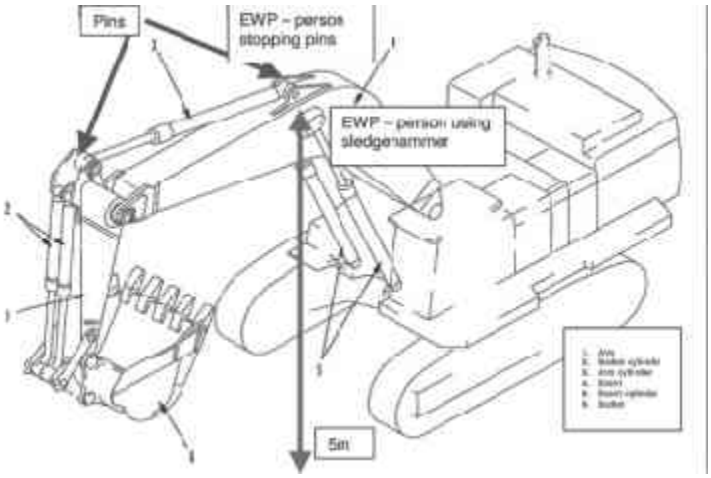

Figure 1: Task set-up

The Solution

After stopping the task, a team discussed possible ways to improve the task and reduce the risk of equipment damage or injury. It was decided that a piece of equipment was required that would limit and control the movement of the pin once knocked out of the boom. A mechanical stop was decided as the best solution. The workshop's serviceman (with welding skills) was asked to make a rough design and construct a device that would achieve this. Once constructed and implemented the job was performed safely and the following roster rotation, the workshop's boilermaker refined the design and built another two pin stoppers, which was implemented permanently. In brief, the new system consists of a mechanical stop device installed using the pre-existing pin retainer mounts.

Figure 2: Pin stopper with Pin expelled from Boom

Figure 3:Pin stopper in normal operation

Benefits and Effects

The benefits of implementing this innovation include:

- Allows the pin to disengage from the cylinder without total removal. Thus eliminates the risk of pins falling during the removal and damage to equipment or a person.
- This innovation eliminates the second person from the task and takes away a *red/danger zone*.
- This innovation eliminates uncontrolled energy associated with the pins.
- Eliminates awkward postures required to reach over the boom to control the pins.
- Aids in the assembly as the pins are in position and ready to be pushed into place.
- Decreased downtime by four hours
  - o Reduced to one person job
  - o Eliminated the organisation of two man lift
  - o Eliminated the need for a second overhead crane
- This innovation is light, easy to fit and uses the existing retaining bolts to secure it to the machine.
- The cost of this innovation was less than $500
- With respect to the hierarchy of control, the implementation of this innovation improves a level from administrative controls to engineering (Figure 4).

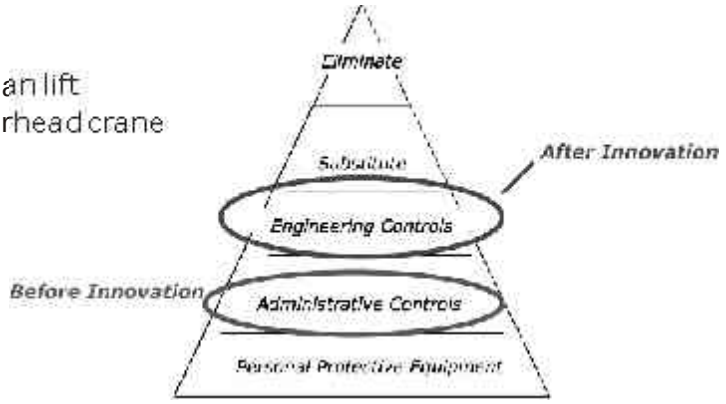

Figure 4: Hierarchy of Controls Implementation of innovation improved a level

Transferability Across Industry

This device could be made to suit any pin of similar design, for example loaders (Komatsu WA900). Furthermore theis concept of this innovation could be applied across any industry to make working at heights safer and reduce the risk of equipment falling whilst working at heights.

Innovation

Risk Assessment Before and After Implementation:

	Consequence	*Likelihood*	*Risk Rating*
Before Implementation of Innovation	Moderate	Moderate	H18
After Implementation of Innovation	Minor	Unlikely	L5
Level of Risk Reduction (Before - After)	13		
Percentage Risk Reduction	**72.2%**		

Risk Analysis Matrix

Likelihood	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
	Consequences				
Almost Certain	S 11	S 16	H	H	H
Likely	M	S 12	S 17	H	H
Moderate	L 4	M	S 15	H	H
Unlikely	L 2	L	M	S 14	H
Rare	L 1	L 3	M 6	S 10	S 13

Risk Scores are determined by using the above risk analysis matrix in conjunction with the RTA Weipa Standard Detailed Risk Definition and Classification Matrix.

H = High risk	It is unacceptable to carry out any tasks with this risk score
S = Significant risk	Acceptable with Superintendent sign off
M = Moderate risk	Acceptable with Task Manager sign off
L = Low risk	Acceptable with Task Manager sign off

How do we achieve 0 PSI and cover all Safety Issues?

A Hard Barrier for Safe and Effective Removal of Tyres on Earth Moving Equipment

Zinifex Century Mining

Proposal By

Scott Petrie

Development Team

Rimex Karl Krajewski

Zinifex Limited- Jeff Innes

Century Mining Alliance Steve Allard, Scott Petrie, Ian Watson, Rod Dugmore and Malcolm Henry

HISTORY

Corner findings from a fatality investigation asked for a Hard Barrier to be found to prevent a tyre related accident from ever happening again.

In the past few years there has been a lot of attention to verify the correct pressure to deflate tyres prior to removing them from a hub assembly.

Of note being demountable rims.

The dangers involved in the removal of tyres from rim assemblies have been well documented in various investigations

In most cases the main contributing factor identified was not deflating tyre and rim assemblies prior to removal.

Zinifex Century Mine and the Century Mining Alliance Maintenance Team has the belief that if you make it easy and usable to the people who have to do the job on a daily basis - they will embrace the change and it will become part of every day practice (A CULTURAL CHANGE).

With that in mind this submission is not about a single innovation it is about innovating a system for conducting rim assembly removals on Earth Moving Equipment that combines 2 separate innovations.

Either innovation on their own will improve safety but together they address the implementation of a HARD BARRIER.

PAST PRACTICES

At Zinifex Century Mine tyres are deflated to 15 psi or lower.

When the tyre is at 15 psi or lower the process is signed off by the tyre bay supervisor prior to the tyre is removed.

On completion of sign off on tyre and rim assembly check sheet the tyre fitters then continue with the removal process.

EXPOSURE

In the next 12 months the tyre bay team will complete in the vicinity of 1000 plus scheduled tyre changes on Komatsu 830E rear dump trucks.

Inclusive is 500 plus scheduled changes on other rubber tyred equipment on site. With an additional factor of 10% allowed for unscheduled tyre changes

At each time the deflation issue comes into play.

INNOVATION

Develop a system to achieving 0 psi every time that was Safe and Easy for tyre bay crews to use.

Combined efforts from the development team have led to the development of a tyre bead-breaking tool.

The tooling developed enables tyre bay personnel to break the tyre bead at positions three and five on 830E Haul Trucks fitted with Rimex Double Gutter Rims.

Flow on effect being the world first effective installation of Rimex Double Gutter rims on Komatsu 830E Haul Trucks

Rimex TSRDG Rims were installed on one 830E truck and tested for 1000 hours in mining conditions. During this period Safety process risk assessments was completed with job specific JSA's and SWI's being developed by the tyre bay team members.

Results

1. We have achieved a Hard barrier during tyre changes on 830 Komatsu trucks fitted with TSRDG Rims and safely achieving 0 psi
2. Significantly reducing the risk associated with the use of impact guns
3. Reduced down time during tyre maintenance
4. Nominated as finalists in the 2006 Queensland Safety innovation awards
5. 2006 safety innovation led to a tool designed to remove wheel retaining cleats and reduce the to tyre fitters.
6. Implementation of the TSRDG Rims has led to safe and effective removal and installation of retaining cleats during tyre changes.

TSRDG Bead Breaker Tool or Big Foot

Fall Restraint – Protecting People Working Near Excavations and the Open-pit. BMA – Norwich Park Mine

Chris Currier

The Problem or Initiative

In 2005 in Queensland, a coal miner fell from a high-wall into an open-cut and died as a result of the fall. Norwich Park Mine set about examining site activities and determined the same hazard existed at site and the potential for falling to a lower level was real.

Two projects were initiated as a result of this sad outcome and one became known as the 'fall restraint project'.

Resulting from discussions with Surveyors and other persons needing to work near the open-cut, a need was identified for a simple and easy-to-activate process which stopped persons from falling to a lower level.

This project therefore can be seen to have been initiated to eliminate the risk to employees of falling off the highwall during inspections or other tasks. It has witnessed the introduction of a fall restraint device for persons working in close proximity to open edges and introduced a simple process that will effectively eliminate risks in such an environment. Those who benefit from this device include; Open Cut Examiner, surveyors, supervisors, pump crew, mining personnel, engineers and tech services. The shortfall in protection for these employees was identified through a risk assessment process of the high consequence potential for those involved in working on the edge of a highwall.

After initial development at Norwich Park Mine, a task force was formed between Saraji and Norwich Park Mines. This group performed a further risk assessment to identify the most effective anchor system for a vehicle, which was considered the best anchor for the fall restraint device. Other considerations included isolation issues, use of hardware, training or administration, stabilisation of vehicles and simplicity of system or ease of use.

The Solution

The device developed to achieve project objectives would have to be functional, simplistic, practical, easily accepted and therefore used by the workforce. After thorough research was conducted into available products on the market, a fall restraint belt was selected which offered the added advantage of being able to be worn as a regular belt by each person. The belts subsequently were purchased and delivered to site.

The other two components of the fall restraint system were (1) an adjustable runout rope and fixing system and (2) a suitable but portable anchor device.

This project has resulted in workers being able to work with a greater degree of protection in the event of tripping, slipping or a minor movement of material underfoot than previously and all users reporting they feel much safer when using the device. Users also report the device is simplistic in its applications and easy to activate.

The system is currently transitioning from its trial phase into full implementation, with tools simply awaiting a formal procedure to be written and a training package rolled out to users.

The project team experienced difficulties with obtaining deliverables for initial set ups in a timely fashion including training, scheduling for training and components. In addition to this, the process of construction for the anchor points and lock boxes, all built to project specifications proved extremely lengthy because they had not been fabricated for this application before.

The project team has experienced a lack of interest in the project which has been quite unexpected considering the recent fatality from a highwall fall within the mining industry. It is believed this lack of interest is perhaps caused by industry not fully acknowledging that some employees do go across the high and low safety rills as it is believed this makes their work easier i.e. surveyors installing control stations, pump crew work installing highwall pumps and mining personnel for inspection of walls and observation of in-pit-operations.

Norwich Park Mine has accepted that people do go over and are likely in the future to continue to go over the safety rill in carrying out their work. They have looked to proactively manage this issue, accepting that human error and taking short cuts is and will remain part of the human condition and is and will remain a common factor in the cause of incident. The challenge has proved extremely frustrating for the project team who are now offering a quick, simple and effective system with a mobile anchor that can save lives. Through the correct training and application of the fall restraint, relevant parties can now safely cross the rill, confident in the ability of the fall restraint system to prevent them from falling off the highwall.

The most significant challenges experienced throughout the early stages of this project were establishing positive isolation of the vehicle and identifying anchorage points on the vehicle. Other challenges related to the process of establishing the project requirements for both the device itself and the system of implementation and included:-

• Ease of use of the device and its system. It was desired that the fall restraint device be easily attached and the appropriate anchoring belt be able to be worn as part of an everyday uniform.

• The personalisation of each system. The project team insisted that each employee working in the vicinity of the highwall be fully equipped with thedevice and appropriate components.

• Simplification of the vehicle isolation procedure while maintaining compliance with Fatal Risk Protocols. Considerations included if the car could still be driven and where the rope would be attached.

• Time span of the procedure. Time effectiveness would be the key to implementing the system and its acceptance in the workforce.

Benefits/Effects

The primary achievement of the fall restraint project has been the extensive trialling of a system of controls to eliminate the risk of falls to a lower level ie from the highwall. These risks associated with working on the highwall have proved responsible for fatalities within the mining industry. This development is impacting the workforce through the provision of a safer work environment.

Essentially the Fall Restraint is a standard unit of restraint equipment but with an anchor point on a light utility vehicle and training and administration controls.

Further modifications to practice include the introduction of a lock box and a certified anchor point to completely isolate the vehicle and the project team is currently amalgamating these to ensure the system will be less vulnerable to human elements and decisions. For example, people will no longer be able to jump in the car and drive 'just a little way' because there will be no way to drive without removing the lanyard from the anchor point. The next level for these improvements will be to continue work with the outsourced engineering group and develop a replicate system for 4x4 wagons.

The newly introduced fall restraint device is functional, simplistic, practical and easily accepted throughout the workforce. The pilot group for the Fall Restraint at Norwich Park Mine can now place their control stations on the highwall in a restraint system, eliminating the potential of falling off the highwall.

Feedback for the system has been excellent with users frequently commenting on the ease of use of the Fall Restraint and their feeling comfortable and confident while working on the high wall. Previously, work on the highwall was regarded as a high risk/high consequence action. Although still high consequence, while the utilisation of the Fall Restraint, it has now been reduced to a low risk.

Currently, Norwich Park Mine surveyors are the pilot group and are using the system and following its full implementation on site, it will be linked to the "Man Down" system, the other initiative associated with the high wall fatality.

Although continuing to prove highly effective, changes are constantly being made to the system to ensure it provides the highest level of protection possible and no one can shortcut the system in any way. These include evaluating target groups and potential improvements such as designing anchor points for light vehicle wagons.

Transferability across Industry

This project can be applied to other locations and situations where substantial risks exist with people working in close proximity to open edges. It is anticipated in the future that all light vehicles will be issued with the Fall Restraint Features as standard fabrication additions.

This device is witnessing the first tangible development to account for the ability to actively and productively carry out work on the edge of the highwall. For this reason, it is well establishing itself as best practice in its field and definitely proving sustainable.

The elimination of risks associated with working in close proximity to open edges and responsible for fatalities within the mining industry will always prove effective and of negligible costs. The primary benefit has been the significant reduction of the potential of fatal injury. With each complete unit including personal equipment and anchor points priced at less than $2,000, the project has clearly proved extremely effective in pursuit of Zero Harm.

Innovation

The introduction of the fall restraint device to Norwich Park Mine has proved highly innovative because the site is a pioneer of the application in this area of the industry. This device is witnessing the first tangible development to account for the ability to actively and productively carry out work on the edge of the highwall. It utilises components and equipment readily available on the market - standard fall restraint gear for working at heights, but it has been simplified for this particular and unique application. Furthermore, as the project gains momentum, improvements are continually being made on the prototype to allow the team to offer employees the best possible solution to proactively managing risks while working on the highwall.

Currently the system features one anchor point with two attachment points which allows for a multiple hook-up. This allows additional people such as Mines Rescue team member's immediate and effective access to an available point for equipment. This would save time in the event of an emergency situation and the anchor points have been developed specifically for this purpose.

Fall restraint standards require equipment be capable of handling 6 Kns and the new multiple hook-up facility allows for 21 Kns. This will further seek to eliminate the possibility of error and decrease the amount of time required to set up an alternate anchor point in the unlikely event of an incident on the highwall as time is a critical factor in successful rescue at heights.

Testimonial (1)

"We are using it and have done up all the procedures for it but are always reviewing as we go. We use it everyday. (Surveyors)

Our daily jobs that we do around high walls, we are able to do safely and more efficiently because it's a lot safer and therefore we are able to do them much better.

The difference between before and after the Fall Restraint is that now you feel a lot safer because you are restrained to something now. Before, we couldn't go to the edge, but now we are restrained and can carry out our work more effectively.

I recommend it to everyone working on a high wall. You've got that feeling that you're more secure and you know nothing can happen. If the Fall Restraint is used correctly you know nothing can happen to you because you are fully restrained. The way it's been set up, if you follow correct procedure and operating procedure you should be safe.

Everyone working on a high wall should be using it for their own personal security and for the protection of the company.

It's very easy to use but it obviously takes a bit more time than what we used to do because it requires set up and checks, but this far outweighs the consequences of not using it.

Since we've begun regularly using Fall Restraint, we've had a couple of reviews of the procedure which has probably found a few areas of improvement, but only because the concept is so new and you have to work your way through the process to be able to incorporate everything possible. Because it's the first of its kind, there are some things you don't know to consider or if they can be done.

But we are continually making improvements.

I think what Chris is trying to do comes from the fact he doesn't want to see a fatality on site. In his experience he knows what it's like working around high walls and knows what the consequences could be and is being proactive in managing issues before anything happens.

Through initiatives like Fall Restraint, we know we're not just there to do our job.

People actually care about us and are trying to make the site a much safer working environment."

IAN WALKER
Surveyor

Above and Below: The Fall Restraint in use by a surveyor on the high wall.

Above: The lockbox.

Right: The lockbox and personal danger tag and lock.

Below: The lockbox certified anchor with lanyard attached.

Dozer Track Handrail System
Rio Tinto Tarong Mine

Background

Dozer tracks have been used as a means of access and work platform when performing maintenance on large bulldozers for a number of years, and this has been the accepted practice in mining and other industries.

As the tracks are uneven, with sloping surfaces and raised lugs, this creates the environment for potential multiple slip, trip and fall hazards.

There have been many injuries and in some instances fatalities, resulting from falls when working on bulldozers reported world wide *(refer Appendix 5)*.

Since the introduction of working at height legislation and given the majority of equipment had been designed prior to this new legislation, there has been an ongoing effort to ensure compliance.

At Rio Tinto Coal Australia's Tarong Mine, considerable effort has been invested over many years to establish safer bulldozer maintenance practices, achieving varying degrees of success. Initiatives included access stairs to cableways and lanyards suspended from overhead gantry cranes. Over the past few years non slip mats have also been used on site to address the trip and slip hazards associated with working on dozer tracks.

Problem & Initiative

Falls from dozer tracks

During a safety audit in early 2006, on fitters working from the tracks of a D11 dozer, it was noted that on occasions the fitters were moving above the RTCA working at heights limit of 1.8 metres. The fitters were instructed to use fall restraint lanyards and harness when carrying out this task in the future. The Supervisor conducted a risk assessment with his team members using the lanyards and harness, concluding that using personal protective equipment to control the hazard was not the ideal solution. Temporary handrails were set up to allow the job to continue and comply with RTCA standards, without the need for harnesses. This solution was viable for a one off task but not practical for this recurring maintenance task.

Fitters were making a conscious effort to stay below the 1.8 metre height limit however, the high potential for a backwards fall while working on the dozer engine at any height remained. Any fall would afford little opportunity of grabbing an object to recover balance, thus it may lead to serious injury through contact with the floor or push arms of the Dozer.

The Occupational Health and Safety consequences of continuing with the use of harness and lanyards could increase the potential for a trip on a section of a lanyard, being pulled off balance by another lanyard or even worse, the awkwardness of being restrained could lead to fitters working with excess slack in the load section of the lanyard to increase their personal mobility.

The Supervisor was determined to come up with an engineering solution that was safe, easy to use, quick to fit, light, portable and would gain fitter acceptance.

Solution

Elimination of the task or substitution was not possible, so engineering out the safety issue around working at height was the next most appropriate measure.

A concept of using individual components which when locked together would form a secure clip together handrail system, was drafted and assessed to determine if practicable. The initiative was discussed with crew members for their input and suggestions. The developed concept was accepted by all other maintenance crews and was supported by management.

A local contractor was then engaged to construct a prototype and the system was subsequently trialled on site.

There was still an issue of some handrail movement and a trip hazard presented by the clamping bolt on the top surface. The movement was solved by adding a web on the underside, placed between the grouser plate bolt heads. This worked well but the assembly still wasn't adequately stable. It was then agreed to slide a new clamping mechanism in from the outside end of the clamping section and move the clamping bolt to the underside of this new section. These modifications were carried out by Tarong maintenance employees.

The changes eliminated the former trip hazard and made the handrails far more secure and rigid.

To test the system against an applicable standard was a problem, due to the angle of the tracks and the temporary fit up nature of the handrail system, which do not conform to standards for fixed handrails and walkways.

An Engineer was consulted to review the handrail design and conformance but was impeded due to the lack of an applicable standard against which to test. A decision was made to use a risk assessment process in conjunction with testing the handrails to the 1000 Newton deflection test in AS 3868-1991. The risk assessment was conducted and results documented *(refer Appendix 1, 2 and 4)*.

The risk assessment also addressed issues including training and briefing of all crews in the manual handling and the correct method of installing the handrail system. Actions were generated to ensure all crew leaders familiarised their crews with the newly developed work instruction for fitting the handrails to the dozer tracks *(refer Appendix 3)*.

Benefits / Effects

Maintaining focus on the task at hand is an important factor in the prevention of injury and risk management. A major benefit of the Dozer Track Handrail System is that fitters can complete maintenance tasks, whilst working at heights using a safe, unique and innovative safety system, without being at risk of a fall from the machine. This means that the fitters can give their full attention to the task at hand and not become distracted by an uncomfortable harness and lanyard.

Fitters carrying parts and tooling onto the dozer in the past have found it very difficult to maintain three points of contact. The full handrail system now allows these tasks to be carried out safely. The handrails system is not limited to a workshop environment as it is easily transported and can be adapted to field maintenance tasks.

A true measure of a successful safety device is to see people willingly accept it because;

- It makes their job safer,
- Is not difficult or time consuming to set up,
- Is easily handled, moved and placed into position.

The Tarong Mine Dozer Track Handrail System has proved to meet these criteria and has been readily accepted by employees.

Transferability across Industry

This system can be fitted to any bulldozer where people are using the track plates as a work platform and fall prevention is required.

For machines with uncommon track sizes and plate thickness, alterations would be required to the size of the track clamps to suit. This modification would need to be overseen by an engineer.

The handrail system is applicable to any industry where dozers are in operation.

Innovation

By applying an open minded approach to a long standing hazard, the work group was able to resolve the working at heights fall potential with a practical engineering solution which is easy to use and could potentially impact any industry which uses Dozers within their operation.

Track Roller Installer
Zinifex Century Mine

The Problem or Initiative

- Current practice is for the roller to be placed on the tynes of a forklift. The forklift operator then positions the roller while personnel have to manually handle the roller into it's final position, as the forklift can only operate in a 2 dimensional range of movement (Horizontal/Vertical). The roller had to be manually held in position by 2 fitters (one inside and one outside the track frame) while the 3rd person fitted the retaining caps, which created great physical strain on the upper torso, limbs and potential for crush and pinch injuries to fitters hands.
- Hazard identified by Trevor Hartwell over a period of time. While effecting repairs to machinery in both workshop and field operations, the conditions can consist of course rock, broken and or wet ground. While no individual event had contributed to the innovation, the above work practice was seen as a potential to cause lost time injury within the work group. It also hindered productivity, as a total of four fitters are needed to mount one roller.

Solution

- The initial concept was developed from adaptation of an existing device, which was mounted to a forklift tyne. This device could only be used in workshop repairs and required a great amount of space to manoeuver the forklift. The use of a forklift created a hazard in itself to personnel performing the roller change out, as they needed to lay down under the elevated tynes to take the weight of the roller and hold it in position while retaining caps were installed.
- It was identified that a counterweight system would allow a greater range of movement, afford better stability by utilizing the same replacement part as the counterweight.
- The innovation can be suspended from a Forklift with jib attachment, overhead and mobile cranes, which allows greater manoeuverability for positioning roller which ultimately reduces turnaround time while creating a safer work environment
- Cost of innovation can be returned through increased productivity and inherent safety improvements within two full track roller change outs.
- Risk assessment- refer to power point. Post risk assessment it was found that no knew hazards have been introduced as the device has low center of gravity, the design allows fitters to stand clear of the attachment point, increases visibility between crane/forklift operator and controlling fitter, eliminates the need of fitters to be prostrate under suspended loads, giving them improved ergonomics to reduce upper body stress

Benefits / Effects

- By using this method it therefore reduced the physical exertion required by fitters, and increasing productivity as it only requires two fitters to remove and replace the roller in 50% of the time.
- Post innovation No accidents or injuries have been recorded during its use. The group immediately responsible (ancillary fitters) number 45 fitters across 3 crews on site. As this is not an overly common task, the potential for injury increases due to unfamiliarity.

Transferability across industry

- The innovation can be used across all industry's' that employ track machinery. The simple design lends itself to be constructed to suit any size machine application.

Thiess Smart Water Trucks 2007
Thiess

PROBLEM / INITIATIVE

There have been numerous serious incidents involving equipment losing traction on haul roads across the mining industry due to over watered roads (see appendix one). This situation results in placing all road users at an unacceptably high level of risk.

It was identified that the existing controls (spot/strip watering) in use at Thiess Qld/NT/Pacific (QNP) project sites were not adequately addressing this hazard., primarily due to the reliance on behavioural change. It was also established that Water Truck configurations had not been modified for a considerable period of time.

Furthermore, the size of the rear dump trucks using haul roads had increased significantly and there is less braking sensitivity for these larger units, particularly on spot-watered roads.

Thiess QNP also acknowledged the need to increase the level of accountability for all personnel associated with the task of watering and maintaining mine roads.

The health and safety of our people is a non-negotiable and we actively seek to enshrine it as a key value. Our goal is to have a workplace free of incidents and injuries and we continue to improve our safety performance from year to year even as our business continues to grow. It is therefore a commitment of Thiess QNP to address the hazard of over-watered roads.

Thiess Water Truck in Motion (Top) and Medium Speed (Below)

CASE STUDY ONE -
LIGHT VEHICLE ROLLOVER

NIL INJURY
$8000 DAMAGE

The light vehicle started to slide sideways at approximately 40-50kph until contacting a dry section of road, causing the vehicle to roll onto its roof.

There was excessive water on the road surface near the intersection.

THE SOLUTION

Strategies and initiatives developed to address the problem

Thiess QNP's safety slogan *Positively Safe* centres around embracing responsibility both as an individual and as a member of the Thiess team to take care of ourselves, and our team mates. More than a slogan, *Positively Safe* is part of our culture and extends from our *Being Blue* values of Teamwork, Innovation, Integrity and Performance.

In this situation, a *Positively Safe* Imperative (PSI) was used to address the problem of over watered roads. A PSI is an initiative developed to achieve a step change in behaviour and thinking in relation to preventing high potential incidents within Thiess and across industry. It is not limited to implementing a system or innovation, but involves a roll-out, workforce engagement, and compliance expectations as well as providing clear and simple advice on how the company is aiming to prevent the high potential incident.

Thiess QNP's Water Truck fleet was modified by fitting a device that regulates water flow based on the ground speed of the truck (see appendix two). This new Smart Water Truck makes the task of watering easier for the operator, however the operator must still make the decision about whether a road needs more water. It was therefore determined that projects and employees must change their mindset with respect to watering roads and aim to suppress dust only. The Smart Water Truck, in combination with the PSI, provides a good platform to achieving this transfer in thinking. The PSI was developed accordingly to address the following issues:

1. Operator responsibility
2. Supervisor responsibility
3. Water Truck configuration
4. Management of the watering process
5. General requirements

Methods used to assess the risks/inadequacy related to the problem/system

A risk assessment (see appendix three) was conducted in order to determine how the implementation of the Smart Water Truck PSI would impact on the Mines Safety and Health Management System (SHMS) (see appendix four). This also ensured that Thiess QNP continued to comply with the legislative requirements.

The Maintenance and Watering of Roads Procedure (see appendix five) was also reviewed and updated to ensure that it was in line with the Smart Water Truck PSI.

CASE STUDY TWO -
WATER TRUCK ROLLOVER

MINOR INJURY

$10,000 DAMAGE

A Water Truck operator lost control of his Water Truck after watering up the ramp and then driving back down the wet ramp.

The truck slid for approximately 50 metres until hitting a dry section; the truck's momentum caused it to roll.

THE SOLUTION (continued)...

Implementation/methods, improvement of the sites resources and employees and how the solution was trialled and tested

The implementation of the Smart Water Truck PSI began with an initial trial of a new form of water dispersion on the Water Truck fleet at Collinsville Coal Mine - involving a CAT 773E.

After a successful significant trial period, it was determined that the Smart Water Truck PSI would be developed and rolled-out to all Thiess mine sites.

As previously outlined, the PSI addressed key responsibilities and issues in order to create a step change within the organisation to change the behaviour associated with watering haul roads. The implementation for these focus areas included:

Operator Responsibility

- The operator has an increased level of responsibility under the PSI;
- The operator is required to complete an additional assessment under the Black Coal Competency (BCC) arrangement to be permitted to operate the Smart Water Truck (see appendix six);
- Dedicated Water Truck personnel are allocated on a roster cycle basis;
- Operators need to show an increased level of accountability when watering roads;
- The operator has the responsibility to control how much water is applied to the road surface.

Supervisor Responsibility

- Supervisors are responsible for Water Truck operator allocation including verifying competency under the new assessment;
- Whenever dedicated road maintenance activities are occurring, supervisors will need to be directly involved;
- Should an over watering event occur, the supervisor will be required to conduct an investigation to understand the cause.

Water Truck Configuration

- The truck is configured to take information from the speed sensor to determine the volume of water that is to be applied to the road surface;
- The settings have the ability to be adjusted based on seasonal variations and specific project requirements;
- The use of spot watering has been removed from the process.

Management of the Watering Process

- Over watered roads are required to be demarcated and communicated to other road users;
- Where road maintenance activities are occurring, signage and supervisors involvement is increased;
- Each Water Truck has a copy of the How to Guide available in the cab for quick reference (see appendix seven).

General Requirements

- All road users have a responsibility to report over watered roads.
- Drivers of light vehicles must utilise 4WDs when slippery conditions are evident.
- Workshop servicing procedures are upgraded regularly to check the function of the Smart Water Truck and to ensure it is watering correctly.

Assessments made identifying any new hazards introduced by the innovation and how they will be managed

Since the new Water Trucks were commissioned there have been a number of issues in relation to calibrating the water delivery volume to cater for varying road surface material types. We will need to make further adjustments due to seasonal changes, which may involve adjusting spray head delivery rates.

Where relevant demonstrate how the hierarchy of hazard control has been used

The implementation of the Smart Water Truck and the application of responsibilities and management processes hasreduced the risk of serious injury or fatality to personnel. Thiess has utilised a combination of engineering and behavioural modifications to increase the focus on delivering the correct amount of water to the road surface. The innovation improves the safety of all road users by optimising the amount of water delivered to the road surface.

The innovation successfully applies the hierarchy of controls, ensuring higher control quality and improved control confidence during the operation of machines on watered roads. Please see risk assessment (see appendix three).

ABOVE: CONTROL PANEL IN WATER TRUCK - THE SETTINGS HAVE THE ABILITY TO BE ADJUSTED BASED ON SEASONAL VARIATIONS AND SPECIFIC PROJECT REQUIREMENTS.

THE SOLUTION (continued)...

Implementation/methods, improvement of the sites resources and employees and how the solution was trialled and tested (continued)...

At each project, a four week education period was put in place from the date of commissioning of the Modified Water Trucks. Site champions were responsible for the implementation of the PSI and to provide education on the use of the new watering system.

Sub-contract Water Trucks are also inspected to ensure that their water delivery (via the spray bar) is equivalent to that delivered from Thiess units. If they are not up to the Thiess QNP standard they must be modified where the unit is on continuous hire for 3 months or greater. Where modification is not feasible due to short term nature of hire, the Sub Contract Water Trucks are only permitted to be used in areas of the mine where there are no inclines or declines.

MINE SITE ROAD AFTER WATERING

BENEFITS/EFFECTS

Indicate the health and safety benefits or outcomes, factors affecting the use of the innovation and how the effectiveness of the innovation was measured.

The primary benefit of the Smart Water Truck PSI is that it has reduced the risk of serious injury or fatality to personnel.

Outcomes from the implementation of the innovation and the PSI have included:

- Raised level of competency to provide for increased responsibility and accountability when operating a water truck;
- Controlled water output from the water truck spray bar;
- Water delivery output governed by truck speed and water pump speed selection;
- Discontinued practise of spot or patch watering;
- Increased control over road traffic during periods of wet weather;
- Improved management of Road Maintenance Works
- Decreased erosion-type damage to the road surface, reducing the road maintenance requirements
- Reduced water loss from road surface

Health and Safety benefits that have resulted from the PSI implementation include:

- An increased focus on the hierarchy of controls and a commitment to engineer out hazards and ensure we do not repeat incidents;
- A move from an administrative compliance culture to a “make a difference” (see appendix eight) culture;
- An increased focus on personal commitment from all our employees to eliminating incidents and accidents from the workplace;
- Development of clear expectations and clear consequences associated with breaches and non-compliance.

Since we have raised the awareness of the hazards associated with over watered roads, there has been a marked reduction in incidents involving loss of traction. Water use has also been reduced by at least ten percent.

TRANSFERABILITY ACROSS INDUSTRY

The potential for the innovation to be used, modified or transferred to other settings or industries.

The Thiess Smart Water Truck PSI could easily be transferred across the mining industry. All components used on the Smart Water Truck are off-theshelf items. With a small proportion of electrical programming the Water Truck would be relatively inexpensive to set up across a number of different truck configurations.

The key to the system is to match the truck ground speed with the amount of water being delivered to the spray heads. The operator still has a key responsibility to ensure he or she only applies water to a road surface to restrict the generation of dust, not flood the road.

TRUCK IN MOTION, HIGH SPEED - 39KPH,
TWO OUTSIDE SPRAYS

INNOVATION

The application of clever thinking to address the problem or develop the innovation.

The repeat incidents associated with over-watered roads required a change in our Water Truck configurations.

The modifications to our Water Truck fleet were triggered by a need to deliver optimum water volumes to the road surface. This was achieved by configuring an electronic controller that utilised the truck's speed sensor as an input whilst controlling water flow to the spray bar via a series of solenoids and switching options.

We have since fitted a Magna Drive Coupling™ to one of our units to further reduce wear and tear on the hydraulic drive which is connected to the water pump.

Operator input is still required, but rather than being distracted by the need to constantly flick switches on and off to water the roads, they are now able to better concentrate on driving the truck safely and focus on the road surface requirements.

There is room for further refinement, but we have come a long way to addressing a major industry hazard.

WATERED ROAD USING LOW SPEED LOW PUMP UPHILL (TOP)
MEDIUM SPEED MEDIUM PUMP DOWNHILL (BELOW)

Laser Receiver Mounted on Dozer Blade
Xstrata Copper Ernest Henry Mine

Problem

Laser levels are essential to ensure that digging units are producing benches of the correct height. Until recently, laser levels were taken by a Mining Coordinator on foot, standing within two metres of the toe of the dig face. This placed the person at risk of harm from both machinery operating in the vicinity and rocks falling from the dig face.

Figure 1 below shows the working area where the taking of levels was usually performed. The paint mark indicates how close the Mining Coordinators stand in proximity to the face.

Fig 1: Working area layout

In the past, the Mining Coordinators would walk along the face with the staff receiver and paint marks on the ground or rocks to show the digger and dozer operators the desired floor level.

Two Mining Coordinators would take levels at dig faces and dumps three times daily on average.

This was the equivalent of up to six hours of manual labour per day.

Solution

The decision was made to stop the taking of levels in proximity to dig faces until an alternative method could be devised that would allow levels to be taken without exposing personnel to rock falls or vehicles in the pit. The use of GPS was investigated as an option however the depth of the pit and angle of the walls meant that satellite coverage was inadequate to obtain an accurate reading. Installation of levelling devices on dozers and loading units were also considered through this process.

After further research and consultation, the Mining Services area of the operation proposed that a tripod-mounted laser and a receiver, mounted on a dozer blade would completely eliminate any need for persons to take laser levels on foot in front of dig faces at all.

Figure 2 shows the complete system involving a tripod/laser arrangement, as well as the receiver mounted on the dozer.

Figure 2

With this arrangement, the only task which is still performed on foot is to set up the laser and peg, which is a safe distance from any dig face (up to 300m away). Figure 3 shows the set-up of the laser and pegs, which indicate the desired height of the floor.

Figure 3

Figures 4 and 5 below show the installation of the laser receiver. The receiver (protected by a steel guard) is mounted behind the dozer blade. A panel of lights is also mounted in the cab for the operator to view.

There is no need for paint markers as the lights indicate when the dozer blade is operating at the correct level. There is a corresponding light panel inside the dozer cab.

Figure 4

Figure 5

The cost to implement this innovation consisted of:
- $4500 for the laser receiver unit
- $500 for the tripod
- $1000 for installation

The total cost for each complete assembly is $6,000

Benefits and Effects

The installation of laser receivers on dozer blades has achieved the following:
- Eliminates need for tripods to be put on windrows (reducing property damage)
- Eliminates exposure of pedestrians to hazards at and around working faces
- Eliminates working around machinery
- Reduces need for continual checking of levels on dumps and at working faces (saving approximately six manhours per day)
- Provides continuous information to the digger operator (one dozer operates continuously at each dig face)

Transferability

This innovation can be used in any mining or construction industry activity, especially in areas where GPS satellite coverage is difficult to achieve (such as deep open-cut operations). The dozers can also work on dumps as well as at dig faces, allowing application in multiple areas.

Presently, the receivers have been installed on D10 and D11 dozers at EHM. Plans are in place to install an additional on an 854G wheel dozer on site and it is expected that they can be used on other models as well.

Innovation

While this arrangement may have been used in the construction industry, it is not in widespread use in the mining industry, which has used GPS in recent years and still continues the practice of taking levels on foot.

Maintaining appropriate floor control is essential in ensuring the safe production processes in the mining environment and this innovation ensures that the requirements of both safety and production are satisfied.

The innovative features of this unit are...
- It can be easily installed on existing equipment
- Good use of technology
- Cost of the innovation is significantly less than the labour component of the previous practice

Load Cells for Dragline Hoist Rope Tugger Winches
Rio Tinto Hail Creek Mine

The Problem

In June 2005 there was an incident during the change out of the Hail Creek Mine P&H 9020 Dragline hoist ropes.

The hoist rope change out procedure requires a winch rope to be connected to the hoist drum end of the rope. The winch rope is used to control movement of the hoist rope as a D11 dozer pulls the hoist rope out of the dragline house, up along the boom and down to the ground.

Each hoist rope is secured to the hoist via two large bottle bolts. As the tension on the bottle bolts is released, the weight and tension within the hoist rope is transferred to the winch rope via a rigging connection.

Whilst in the process of transferring the tension in the right hand side hoist rope to the winch rope, the swivel within the rigging connection failed on this occasion.

Failure of the rigging swivel caused the winch rope and remaining rigging to recoil backwards from the hoist drum. The hoist rope ran uncontrolled out of the dragline house and up along the boom until the entire length of rope came to rest on the ground below the boom.

The hazards:

- Mechanical Energy components under tension Difficult to gauge rope tensions
- Gravitation Energy objects falling
- System Hazard effective communication of team members monitoring for rope snag was challenging

The risk of injury was ranked as HIGH

Figure 1 Dragline rope on ground after the incident.

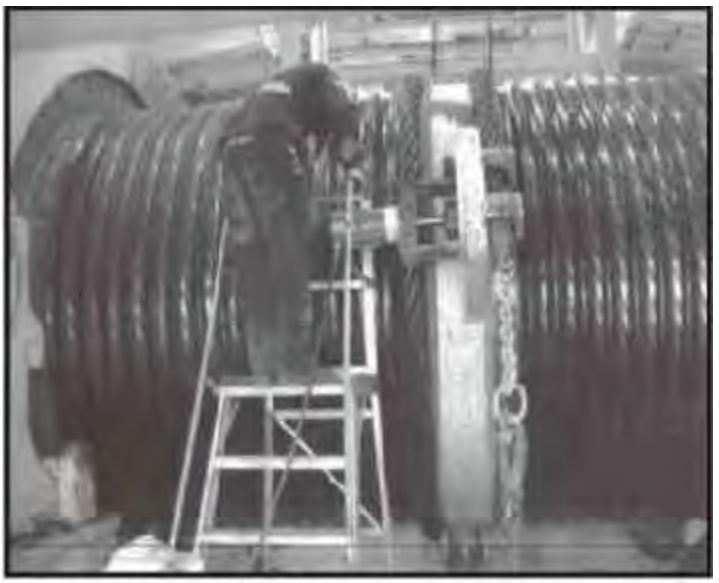

Figure 2 Dragline hoist drum. Shows winch arrangement and bottle bolts being slackened off.

The Solution

The initial investigation involved reviewing and improving processes such as supervision, team training and safe work procedures.

The site field maintenance team conducted an effectiveness review following the incident investigation. They identified that remedial actions were heavily biased towards administrative based risk controls, and while important, needed to be supported by a more reliable level of risk control.

A method to actually measure tension along the hoist rope was sought and eventually the team settled on the use of an electronic load cell. A specialist company was sought and a device designed and fitted to both Hail Creek draglines. The installation of a load cell pin in the winch pulley sheave and a digital display to gauge the winch rope tensions were manufactured.

Feedback from crews is that the system has greatly improved the safety and management of dragline hoist rope change-outs.

Figure 3 Load cell pin in winch pulley sheave and the digital tension gauge.

Benefits / Effects

The installation of a load cell pin in the winch pulley sheave and a digital display to gauge the winch rope tensions have:

- Provided an extra control mechanism for maintenance personnel behind the drum to effectively manage the tension of the winch ropes. Maintainers have instant feedback on any tension changes in the winch ropes, for example, too much dozer pull
- There is now a more effective means of quantifying the maximum load on the winching assembly as the hoist ropes are brought over the boom point sheaves. This was always an estimated amount of load required to bend ropes over the boom point sheave plus the dead weight of the rope

Transferability Across Industry

This innovation is applicable to all sites operating draglines.

The use of load cells to measure the weight of loads required to be pulled horizontally would have value in many areas in underground operations and on construction sites.

Innovation

A recommendation from the incident investigation team was to attempt to source an engineering solution. The maintenance team involved in this innovation took on this challenge without any direction from their leaders.

The methodology they used was as innovative as the solution.

- Bench marking of other sites operating draglines
- Discussions with a company that constructs draglines
- Discussions with several companies who maintain and repair draglines
- Discussions with companies that provide crane hire
- Discussions with companies that supply and inspect lifting equipment

The team finally came up with the idea of using a load cell weight gauge and sourced a specialist company to design and manufacture a load cell system suitable for the task.

The load cell was fitted and tested to ensure no new hazards were introduced. It is used during all dragline hoist rope change-outs and is regarded as an essential component of the dragline hoist rope maintenance program on site.

Centre-Line Safety Socket
BMA Peak Downs Mine

BHP Billiton Mitsubishi Alliance Coal Pty Ltd
Peak Downs Mine

The Problem or Initiative

BMA operates thirty-four draglines at its eight open-cut coal mines in Central Queensland. The draglines remove overburden (i.e. waste material) to uncover the coal seams, using a suspended bucket which is controlled by Drag, Dump and Hoist ropes.

The drag, dump and hoist ropes of the draglines become worn during operations and must be end-for-ended or replaced on a regular basis. To achieve this, the wedge which secures the rope in the socket must be removed to allow the rope to be extracted and changed.

The traditional method of wedge removal (involving a heavy battering ram suspended from a crane) introduces many hazards and has resulted in a number of injuries to BMA personnel. The hazards involved with this frequent task were not conducive to BMA's safety goal of Zero Harm to its personnel.

The Centre Line Socket Safety System can be used on Drag, Hoist and Dump sockets, and totally eliminates the use of the donger and hammers for wedge removal. By eliminating the uncontrolled movement of the donger, the task of wedge removal is turned into a safe, controlled exercise.

The Solution

Peak Downs Mine accepted the challenge of devising a safer method of removing the wedges. Based on his own concept of a wedge removal system, Bill McCurry worked with a local engineering firm to develop specially modified sockets and wedges. These sockets incorporate purpose designed cavities which allow a hydraulic jack to be inserted within the body of the socket. The cavities were reinforced to prevent any loss of strength to the sockets. Without this reinforcement, the sockets could fail prematurely.

The cavity in the socket is just large enough to accommodate the jack and a backing plate. The jack's position allows its force to be exerted directly along the centreline of wedge, thereby eliminating wasted energy. The hydraulic jack easily forces the wedge forward, allowing it to be lifted out.

A 135-tonne high pressure hydraulic jack was developed specifically for the drag and hoist rope sockets.

Trials on both Marion and BE draglines have proved that the wedges can be removed easily with this new system on hoist, drag and dump ropes. Three rigging manufacturers are now involved in developing and refining this system through to full commercial production.

Benefits / Effects

In the traditional rope resocketing method, after the rope has been cut and the tail removed, the wedge is knocked out by four or five people using a donger. Apart from the slip and trip hazards involved on the uneven ground, there is the hazard of uncontrolled movement of the heavy donger, which can weigh up to 300 kilograms.

Even though advances have been made in dragline technology and design over time, the method used worldwide for changing ropes has remained the same for a hundred years.

Alternate systems proposed to reduce hazards associated with this task were found to be lacking in both effectiveness and safety. Current systems wasted a large proportion of energy in their application.

The Centre Line Socket Safety System can be used on Drag, Hoist and Dump sockets, and totally eliminates the use of the donger and hammers for wedge removal. By eliminating the uncontrolled movement of the donger, the task of wedge removal is turned into a safe, controlled exercise

The new system allows the wedges to be removed with the tails intact. This reduces the requirement for oxy cutting, thereby further lowering the risks involved with this task.

The mechanical advantage of the hydraulic jack in the system replaces the physical exertion of the personnel required with the traditional method of the hammer and donger.

The Centre Line Socket Safety System has the capacity to vastly improve safety in a maintenance activity that is carried out on draglines in mining operations throughout the world.

From a cost/benefit perspective, a complete jacking package including pump, jacks, hoses and packers is available for a one-off cost of less than $15,000. This package is capable of re-socketing Hoist, Drag and Dump ropes and can be permanently mounted on a truck encased in its own protective container.

The cost of the centreline socket system significantly outweighs alternate systems such as tractors with hydraulic hammers costing in excess of $600,000, or complete mobile jacking jigs which cost upwards of $100,000.

these alternate systems has proven to be 100% effective or safe and they don't have the portability required for multiple Dragline operations.

Currently the cost of the Centreline modified sockets is slightly above the cost of a conventional socket. As the Centreline sockets enter full commercial production, it is expected that their cost will be no greater than conventional sockets.

The Centreline socket system also has an added benefit of reducing the number of personnel required for the task from five to three.

Since the completion of the final trials, the Centreline socket system has been proven to be a safe and cost effective solution to address the hazards involved in the re-socketing of ropes.

Transferability across Industry

This centreline socket will be a benefit to any open cut mine which utilise draglines in their operations. The system may also be useful to other industries (e.g. shipping, oil rigs, dredges and heavy lifting) that use rope sockets and wedges in their operations.

A number of open cut mines, including some within the BMA group, are already using Centre Line Sockets at their operations as a result of this developed solution. Based on the expression of interest from mines across the globe, it is strongly anticipated that this system will be adopted at a significant number of other operations.

BMA Peak Downs are working with major Ropes and Rigging manufacturers in the region to get this initiative out for use ASAP.

Innovation

Harnessing the maximum available energy required creative thinking to develop an innovative solution that was capable of safely removing the wedges from the sockets in a controlled manner. This was achieved by placing a jack on the centreline of the wedge and socket so enabling the maximum amount of force to be exerted on the wedge.

The major challenge for the project was to develop a system that could remove the wedges in a safe and controlled manner without the use of a hammer or a donger. The project encountered a number of difficulties which needed to be addressed to ensure success.

The first difficulty encountered was to establish how much force was required to remove a wedge from a socket. This was accomplished by removing a socket with the rope intact from a working dragline. Experimentation on jack and cavity sizes established the amount of force required to remove the wedge.

Next challenge involved the hydraulic jack, with nothing available with a small enough cross section to fit within the cavity while exerting enough force to remove the wedge. This was overcome by developing an oval shaped piston. This allowed the jacking force to be increased by 35% while still enabling the jack to fit within the cavity.

Further refinement of the jack now includes a two stage piston. This eliminates the need to remove the jack and place additional packers forward of the piston. The refined solution now completely eliminates the need for a crowbar or hammers in the wedge removal process and makes the whole process more efficient.

Komatsu Rear Dump Trucks
Valve Protection System [V.P.S]
Zinifex Century Mining

HISTORY

Demountable rim assemblies have the potential to spin on the rear hub assembly of an Off Highway Rear Dump Truck.

The consequence can lead to the valve extension at position three or five pulling back under the spacer assembly in between the rear dual assemblies.

Therein lies the problem of how do we safely deflate the inside tyre at position three or five before safe tyre removal process can be initiated.

Past practices known or used

1. Spiking a tyre to allow deflation and safe removal of tyre and rim assembly resulting in a serviceable tyre being lost
2. Visual inspection of the tyre and rim assembly locking ring assembly was intact prior to work commencing

INNOVATION

As part of the CI process tyre bay supervisory staff and team members discussed the problem.

From ensuing discussions a proposal to develop a valve protection / securing system was agreed on.

Team member Jason Cosier suggested a retainer system be developed by the team to address the issue.

Using a cardboard template a proto type was developed with input from the site boilermaking team and tyre bay Supervisor overseeing the project.

The V.P.S developed pulls the inside valve extension off the rim spud and the tyre deflates. Operator is alerted immediately to tyre deflation.

This action then initiates the remedial actions to address the deflated tyre.

Site conducted over 100 physical tests to ensure that every time there was pressure applied to the valve (to simulate a rim spinning) that the V.P.S would stay connected to the valve and pull it off the inside valve spud, with a 100% success rate. The V.P.S cost $120.00 ea to manufacture

V.P.S installed on 830E it is secured to the existing wheel studs

This the first version and besides some basic reinforcement it has not changed.

TRANSFERABILITY

The V.P.S can be fitted to any 830 Komatsu trucks and with little modification would be able to be fitted to any Demountable rim assembly.


QUEENSLAND MINING INDUSTRY
HEALTH & SAFETY CONFERENCE
2007