

Drowsiness and Driving

Defining the problem and tailoring a solution
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The Problem

Operator fatigue is said to be one of the most prevalent causes of accidents within the mining industry. In the surface mining industry alone, some 60 to 65 percent of haul truck accidents are directly attributed to operator fatigue¹

However, recent research has shown that, although fatigue is blamed for causing vehicles incidents it is actually drowsiness that causes the operator/driver to lose control. Fatigue and drowsiness are different physiological states, but they are often confused with each other.

Fatigue is a feeling of tiredness. Drowsiness is more than "feeling tired". It is the state between alertness wakefulness and sleep, characterised by periods of loss of awareness of the "here and now" which some people refer to as micro sleeps or zoning out. Of course it is dangerous to be driving with your eyes closed, but one can drive in a drowsy state with eyes wide open. It is the lack of awareness, whether or not the eyes are open that makes drowsiness so dangerous while driving.

We know drowsiness can affect everyone, even those with the best training and years of experience..

Research has shown that being awake for 17 hours has a physiological effect akin to a blood-alcohol level of 0.05 per cent; being awake for 20 hours is equivalent to having a blood-alcohol level of 0.11per cent. No organisation would knowingly allow a staff member to perform a safety-critical task within an hour of consuming four or five beers.

Unlike alcohol, drowsiness at the time of an accident cannot be measured after the fact by a blood or breath test. In fatal motor vehicle crashes, sleepiness does not show in an autopsy. This leaves very little data on which to base a conclusion on the role drowsiness plays in crashes.

Monitoring drowsiness in real time

According to a report commissioned by the Australian Coal Association "Fitness for duty tests and fatigue algorithms can only predict operator alertness levels at the time of testing and provide a measure of future performance. A system of fatigue monitoring throughout the shift duration is required to detect fatigue in those operators who may present for work in a fit start, but whose performance level may still deteriorate to unsafe levels."²

It is often difficult for drivers/operators to assess the risks of their drowsy driving at the time because often they are not aware that they are dozing at the wheel until after they rouse and suddenly recognise what has happened. A report commissioned by the Minerals Council of Australia states that "humans have a limited ability to predict the onset of sleep"³ Drowsy related crashes can occur without the operator being fatigued. That is why it is crucial to monitor drowsiness in real time to

¹ Caterpillar Global Mining. ViewPoint 2007 issue 2

² Procedures and devices to monitor operator alertness whilst operating machinery in open-cut coal mines, ARRB Transport Research Ltd, Research Report ARR 344 August 1999

³ "Work Design, Fatigue and Sleep" – a Report by the Centre for Sleep Research, July 2004

prevent drowsiness related incidents from happening. That is in addition to any requirement to comply with regulations about the hours of work etc.as stipulated in fatigue management plans.

Until recently there was no way to monitor the alertness/drowsiness of drivers continuously. [OPTALERT](#) has developed a drowsiness monitoring system that takes the guess work out of drowsy driving, by providing objective information about drivers' physiological state as they drive.

OptAlert-MOS is a Mine Operators' Safety System, specifically designed for the mining industry that continually measures operators' drowsiness warning them when their drowsiness first begins and before it reaches dangerous levels.

The system works through a pair of innovative glasses worn by the operator. The glasses monitor the operator's eye and eyelid movements. This information is then analysed by an in-cab processor to determine the operator's level of drowsiness in real time.

Optalert-MOS warns drivers when their drowsiness first becomes risky. Audio and visual warnings are issued during early stages of drowsiness, while an Operator is still alert enough to take suitable precautionary measures, return to an alert state of mind and continue to work in a safe condition. This initial warning can stimulate alertness, at least temporarily, and often without the need to stop the vehicle. If drowsiness continues to set in, a second warning is given, that signals the need to implement company specific drowsy driving (fatigue management) policies.

Operation controllers can receive real time information about their drivers' state via their in-vehicle telematics systems, enabling them to intervene when necessary.

Tailored Fatigue Management

Fatigue management policies should involve a range of strategies from fitness for duty tests through to education and training programs. Up until now, such policies were developed from theoretical calculations of the driver's state based on the time of day and their subjective reports about previous sleep that can be quite unreliable.

OptAlert-MOS not only monitors the operators' drowsiness level throughout each shift , it also enables fatigue management policies and practices to be optimized, based on objective measurements of the drivers' physiological state while they are driving. This data can be automatically transmitted from the vehicle to the OptAlert-FRP (Fatigue Risk Profiler) Managed Service.

The OptAlert-FRP Managed Service summarizes each operator's fatigue risk data to compile specifically tailored Fatigue Risk Profiles on an hourly/daily/weekly/monthly basis. Detailed risk profiles (per operator/per shift/per site/per company, etc) are then compiled and forwarded via email to nominated company personnel. The Fatigue Risk Profiles are designed to assist managers to understand the fatigue patterns within their operation and to incorporate that information into Fatigue Risk Management Systems on an ongoing basis.

Real time feedback

Fatigue policies can be enforced by the organization, but they are only effective when implemented by drivers/operators. OptAlert-MOS empowers operators to comply with fatigue management policies and regulations. The operator's fluctuating drowsiness level is presented on a dash-mounted indicator, as a score from 0 to 10. The higher the score, the drowsier the operator is. The indicator

also presents the risk for a drowsy related crash as: High, Medium and Low. This information allows operators to take control of their fatigue and manage their drowsiness.

To learn more about the Optalert™ system visit www.optalert.com or call 1300 678253

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