



The EMESRT Story (2006-2008)

Mining companies around the globe have long struggled with the need to ensure that earth moving equipment is designed to be operated and maintained under all site conditions without causing harm to people. Incident and accident data from a range of sources clearly identify mining equipment related issues as major causal factors. One Australian source, the NSW Department of Primary Industries' International Mining Fatality Database Project Report (2008) noted that "Approximately 77% of mining accidents resulting in a fatality have... involved equipment". The largest number of fatalities were associated with trucks; the next with LHDs.

Many of the technical advances in equipment design over the past few decades have not been matched by advances in the human factors design of mining equipment, resulting in a "design vacuum" that must be filled prior to commissioning new equipment. This "design vacuum" is generally filled by local dealers. They retrofit equipment according to customer requirements to mitigate risks that have not been designed out by the Original Equipment Manufacturer (OEM). Mining companies have been frustrated by lost time and additional costs associated with this need to retrofit ex-factory designs. Some companies have attempted to address the problem by negotiating company or site-wide 'solutions' to equipment designs, but this has not simplified or clarified the issue from the point of view of the equipment manufacturers.

A number of mining companies operating in Australia first discussed the concept of a joint customer approach to improve the Human Factors design of earth moving equipment at the factory level in 2004. They agreed that a new approach to engaging with OEMs was needed; one that would define the "Problem", in other words, the basis of the risks, rather than dictate the "Solution".

The Earth Moving Equipment Safety Round Table (EMESRT) was formally established in 2006 by six global mining companies to establish a process of engagement between Original Equipment Manufacturers (OEMs) and mining customers.

EMESRT Purpose

Accelerate the development and adoption of leading practice designs for earth moving equipment to minimise the risk to Health and Safety through a process of Original Equipment Manufacturers (OEM), contractors and end user engagement

From late 2006 until the end of 2008, the EMESRT focussed on earth moving equipment used at surface mining operations. At the initial engagement meetings with equipment manufacturers, EMESRT member company representatives outlined the approach to risk management taken by mining companies that went beyond standards, to ensure the health and safety of people who operate and maintain surface earth moving equipment. Having successfully aligned company views to create a "common voice", EMESRT was able to present a clear image of the "Problems" facing site users of earth moving equipment. The OEMs responded enthusiastically to the material presented and expressed their support for future engagement. They encouraged EMESRT to continue with the development and dissemination of educational and information resources to assist the process.



In September 2008, Caterpillar invited EMESRT representatives to participate in their HSEC Forum held in conjunction with MINExpo 2008. Seven original equipment manufacturers of surface mining equipment, including Atlas Copco, Terex, Le Tourneau, Liebherr, Hitachi, Komatsu and Caterpillar, are continuing active engagement with EMESRT in 2009.

EMESRT resource materials

EMESRT has developed a range of resource materials that are freely available online. These resources have also been incorporated into a narrated CD that provides background information about EMESRT and access to the resource materials.

Fifteen priority topics were identified by the EMESRT member companies where incorporation of human factors issues early in the equipment design life cycle would help designers to reduce health & safety risks to an acceptable level. **EMESRT Design Philosophies** specific to surface earth moving equipment, particularly haul trucks, have been developed for each of these 15 topics.

Mining companies generally manage risk to ALARP, or **As Low As Reasonably Practicable**, through the use of the Hierarchy of Controls, otherwise known as the Safety Precedence Sequence. Consideration is given to recognised standards when identifying control measures, but thinking about how best to mitigate risks goes far beyond the use of standards. This approach to managing risk underpins the format in which the EMESRT Design Philosophies are presented; to help with risk analysis and identification of control measures. The table below shows the list of EMESRT Design Philosophies, or 'DPs', as they are commonly known.

EMESRT Design Philosophies
1. Equipment Access & Egress
2. Working at Heights
3. Noise
4. Whole-body Vibration
5. Fire
6. Dust
7. Isolation of Energy, including parking
8. Visibility / collision detection & avoidance
8. Machine stability / slope indication
10. Guarding
11. Controls and Displays
12. Tires & Rims
13. Manual Handling
14. Operator Workstation
15. Confined Spaces

Table 1: List of EMESRT Design Philosophies

Each Design Philosophy is championed by an EMESRT member company representative and outlines an aligned EMESRT viewpoint on objectives, general design outcomes and risks or, in

general terms, the “Problems” to be mitigated related to that particular topic. The image to the right of the table shows the standard format of a Design Philosophy, with the text describing the ‘risks to be mitigated’ and ‘examples of industry attempts to mitigate risks’ supported by relevant images.

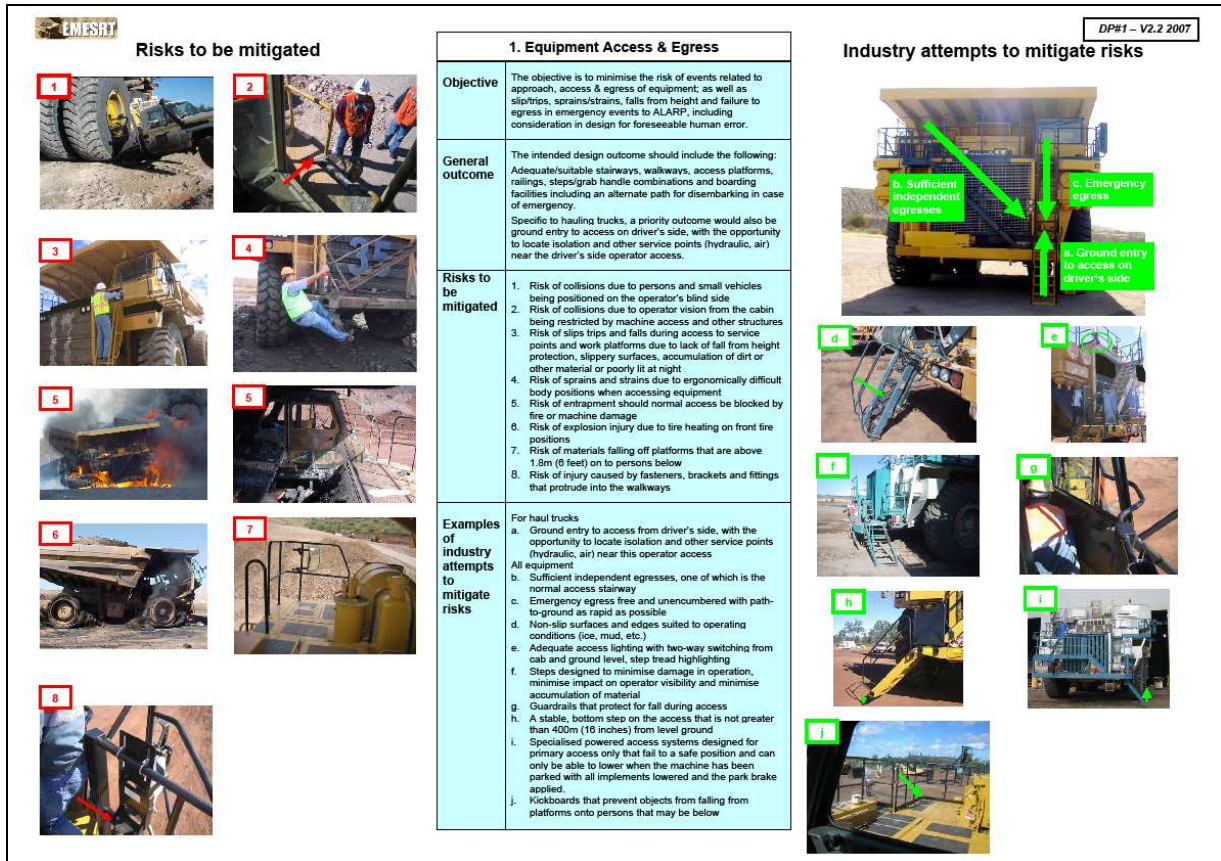


Figure 1: EMESRT Design Philosophy for Equipment Access & Egress

EMESRT regards operability and maintainability as major design challenges for improving human interaction with large surface earth moving equipment. Ultimately, the implementation of a comprehensive equipment review process, including operability and maintainability, initially implemented at all design phases, build phases, initial site operation and finally post retrofit, will ensure that all critical design issues related to operability and maintainability tasks are addressed early in the asset lifecycle.



The ***Operability and Maintainability Analysis Technique (OMAT)*** is a task oriented EMESRT resource that has been developed to help designers identify and understand the human factors issues associated with operating and maintaining equipment.

OMAT.....a tool to help OEMs “design out” the risks people face when operating and maintaining equipment

OMAT is a qualitative risk assessment technique which systematically assesses the risks to be mitigated by utilising the information contained in the Design Philosophies.

In 2008, the Minerals Industry Safety & Health Centre (MISHC), at the University of Queensland, undertook a research project funded by the Australian Coal Association Research Program (ACARP) to develop and trial the OMAT process. OMAT has been trialled at sites in Australia on mining equipment designed by two different OEMs. OEM personnel relevant to each piece of equipment participated in these trials.

The case study material derived from these trials will be a useful resource for both designers and site users. It will help manufacturers achieve the desired design outcomes and provide site users with risk based information to guide the purchase of new equipment.

To assist with dissemination of resource materials, EMESRT has supported the development of the ***MIRMGate EMESRT web portal***, which is managed and populated by MISHC. This portal provides a user friendly interface that links users directly with a range of information resources specific to the Design Philosophy ‘risks to be mitigated’ and ‘examples of industry attempts to mitigate risks’. The Minerals Industry Risk Management Gateway, or MIRMGate, as it is commonly known, is an existing online system that allows users to search for, and link to, high quality minerals industry relevant risk management information. It hosts both the MIRMGate EMESRT web portal and TYREgate, which is linked to the EMESRT DP for Tires & Rims, and provides up to date access to causal factor information about issues related to the management of tires and rims. A similar causal factors database for Isolation incidents is currently under development and is expected to be released in late 2009.

For online access to the interactive Design Philosophies go to:<http://www.mirmgate.com/>

The EMESRT CD (2008) can be downloaded at <http://www.mirmgate.com/emesrt.asp>

TYREgate is online at <http://www.mirmgate.com/tyregate/>

A useful feature of the MIRMGate EMESRT web portal is the ‘***EMESRT Alert Service***’. This service has been set up to help users keep up to date with the latest information about each Design Philosophy.

Free registration for the Alert Service is available at https://www.mirmgate.com/alertservice/alert_service.asp.



EMESRT in 2009

In 2009, EMESRT will focus on mining equipment used in surface, underground and exploration activities. Four Technical Groups will undertake the steps required to engage with relevant OEMs and to develop resource materials that will assist with the engagement process.

2009 EMESRT Technical Work Groups

- Surface
- Underground Coal and Soft Rock
- Underground Hard Rock
- Exploration Drilling

The EMESRT Advisory Group, which comprises one representative from each of the EMESRT member companies, will provide the strategic direction for EMESRT and oversee Technical Group activities to ensure consistency in the message to the OEMs. Anglo American, Barrick, BHP Billiton, Newcrest, Newmont, Vale and Xstrata are financial members of EMESRT for 2009.

MISHC will continue to provide support for the EMESRT Advisory Group and Technical Group requirements. Key services provided by MISHC are facilitation, project resources management, Human Factors advice, administration, communication, information dissemination and EMESRT resource development, including review of existing DPs, development of new DPs, OMAT trials and expansion and updating of the MIRMgate EMESRT web portal.

The EMESRT Surface Group, with support from MISHC, will review the existing 15 DPs for surface mining equipment to ensure that they convey appropriate information to assist with design improvements. The Underground Coal & Soft Rock and Exploration Drilling Groups plan to develop additional DPs specific to the equipment used in those areas of mining. The Underground Hard Rock Group will customise the existing DPs to reflect the design issues associated with equipment used in hard rock mining. This group plans to compile and analyse relevant health and safety data and source images to add further meaning to the Design Philosophies for Underground Hard Rock equipment.

The 3 new Technical Groups (Underground Coal & Soft Rock, Underground Hard Rock and Exploration Drilling) will establish contact with relevant OEMs and introduce the EMESRT approach to improving equipment design so that risks are reduced to an acceptable level. The Surface Group will invite relevant OEMs to provide input to the DP review, and will update the existing DPs with new information and images to ensure the relevance and currency of the EMESRT DPs.

Despite the current economic downturn, interest in EMESRT remains high, with companies committing resources that are already thinly stretched. Individuals from EMESRT member companies continue to champion the development and review of the Design Philosophies and to spread the word about EMESRT by speaking at forums in a number of countries, including the United States, Canada, Australia and Asia. With the cooperation and involvement of the major equipment manufacturers, it is anticipated that equipment designs of the future will demonstrate the success of the EMESRT initiative.

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