EMESRT – driving mining equipment design improvements

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The Earth Moving Equipment Safety Round Table (EMESRT) was formally established in 2006, by a group of global mining companies, to accelerate development and adoption of leading practice designs for earth moving equipment. EMESRT engages with Original Equipment Manufacturers (OEM) to facilitate understanding about design issues that cause harm to people who operate and maintain mining equipment.

Two years ago, when EMESRT was first introduced to the Queensland Mining Industry Health & Safety Conference, the focus of this initiative was solely on improving the design of surface mobile equipment. This paper discusses the progress made by EMESRT since 2007. But first, a brief account of how EMESRT came to be.

The story so far.....
Traditionally, the path taken by mining companies to secure equipment that can be safely operated and maintained has been to dictate solutions for each piece of equipment, with companies and sites demanding their own customised designs. Original equipment manufacturers (OEMs) have been unable to meet these needs on a competitive basis, instead, opting for basic Standards driven design solutions, while dealers fill the design gap by retrofitting equipment to minesite requirements. Attempts by EMESRT member companies to influence design have met with limited success, necessitating the need for retrofits that result in delays to equipment delivery and availability on site.

In summary, the key drivers for the formation of EMESRT were

- Multiple solutions were not integrated adequately
- Solutions were not applied globally
- Hierarchy of controls was not applied effectively
- Major Customers were individually and spasmodically trying to influence OEM designs by dictating add on solutions

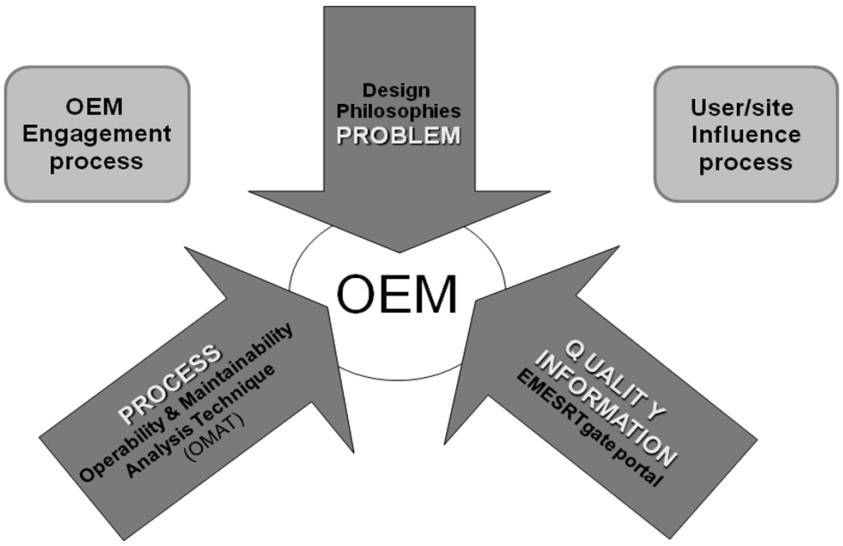
It was agreed that OEMs were in the best position to design quality solutions, provided they understood the issues adequately. Informal discussion amongst some companies

in Australia, including AngloCoal Australia, BHP Billiton, Rio Tinto and Xstrata Coal led to the consensus that a new, global approach was needed to improve equipment design. These companies were soon joined by Freeport McMoRan, Newmont and Barrick, and in 2007 became the founding members of EMESRT. Vale joined in 2008, followed by Newcrest in 2009. The current global financial situation has forced some membership changes on EMESRT, with Rio Tinto and Freeport McMoRan no longer current members. Rio Tinto retains close ties with EMESRT, while other companies are showing a growing interest in EMESRT membership.

The EMESRT approach to engagement is to speak with a 'single voice', representative of a large proportion of the global mining industry, by aligning member company views about priority issues. In late 2006, in a series of meetings, EMESRT initiated engagement with surface mining equipment OEMs, including Terex, Le Tourneau, Liebherr, Hitachi, Komatsu and Caterpillar. A second round of face to face engagement followed in late 2007, with Atlas Copco added to the list of OEMs.

These meetings were facilitated by Professor Jim Joy, Director of the Minerals Industry Safety & Health Centre (MISHC) and attended by representatives of EMESRT member companies. At the request of EMESRT, the OEMs assembled a range of personnel, including marketing people, designers, engineers and others with technical expertise. Meeting agendas ensured that both groups, OEMs and EMESRT, had an opportunity to outline their respective approaches taken to design. EMESRT also provided an overview of the mining company approach to managing risks to people who interact with mining equipment.

EMESRT engagement strategy & resource materials



The success of any engagement relies heavily on effective communication. To ensure that the EMESRT message is clearly delivered and understood, EMESRT, in conjunction with MISHC, has developed a range of information resources to help OEMs understand equipment design issues associated with mining equipment.

The ***EMESRT Design Philosophies***, or 'DPs', as they are commonly known, provide a platform for discussion about equipment design issues by describing the 'Problems' facing site users for each of fifteen key issues. Each DP follows a common format that outlines the aligned objective, general design outcome and risks to be mitigated that should be considered early in the design life cycle.

Mining companies generally manage risk to ALARP, or **A**s **L**ow **A**s **R**easonably **P**racticable, 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 lists the 15 EMESRT DPs developed for Surface Mining Equipment.

EMESRT Design Philosophies
1. Equipment Access & Egress
2. Working at Heights
3. Noise
4. Whole-body Vibration
5. Fire
6. Dust, DPM & other airborne hazards
7. Isolation of Energy, including parking
8.Visibility / collision detection & avoidance
9. 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

Providing information that enhances understanding is one part of the equation; applying this knowledge effectively to produce the best possible design solution for the safety of operators and maintainers is another key part. EMESRT regards operability and maintainability as major design challenges for improving human interaction with large surface earth moving equipment.

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

utilises the information contained in the Design Philosophies to systematically assess the risks to be mitigated.

In 2008 MISHC undertook a research project funded by the Australian Coal Association Research Program (ACARP) to develop and trial the OMAT process. Case studies derived from OMAT trials will be useful resources for both designers and site users. They will help manufacturers achieve the desired design outcomes and provide site users with risk based information to guide the purchase of new equipment.

……a tool to help OEMs "design out" the risks people face when operating and maintaining equipment

By encouraging their sites to participate in OMAT trials, EMESRT member companies are helping to build the case study material needed so that OEMs can make informed decisions about the value of design solutions.

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.

Online dissemination of EMESRT resource materials

To assist with dissemination of resource materials, EMESRT has supported the development of ***EMESRTgate***, a web portal hosted by the Minerals Industry Risk Management gateway (MIRMgate), which is managed and populated by MISHC. This portal provides a user friendly interface that links users directly with information resources specific to the Design Philosophy 'risks to be mitigated'. It also offers some 'examples of industry attempts to mitigate risks', such as those developed by sites and showcased via industry Innovation Awards, that may stimulate thinking by designers.

A useful feature of EMESRTgate is the '***EMESRT Alert Service***'. This service helps users keep up to date with the latest information about each Design Philosophy by delivering links to relevant resources direct to users' email inboxes.

MIRMgate is currently being redeveloped to accommodate a range of web portals, including the existing TYREgate, which provides users with up to date access to causal factor information about issues related to the management of tyres and rims, a topic which is featured in the list of EMESRT DPs. A similar style of causal factors database for Isolation incidents (ISOgate) is currently under development, and is expected to be released in late 2009.

MIRMgate users who subscribe to ***MIRMgate News*** will be notified when the new MIRMgate site is due to be released. EMESRT updates also appear in this newsletter.

Access the EMESRT DPs at http://www.mirmgate.com/

Download the EMESRT CD at http://www.mirmgate.com/emesrt.asp

Register for EMESRT Alerts at https://www.mirmgate.com/alertservice/alert_service.asp

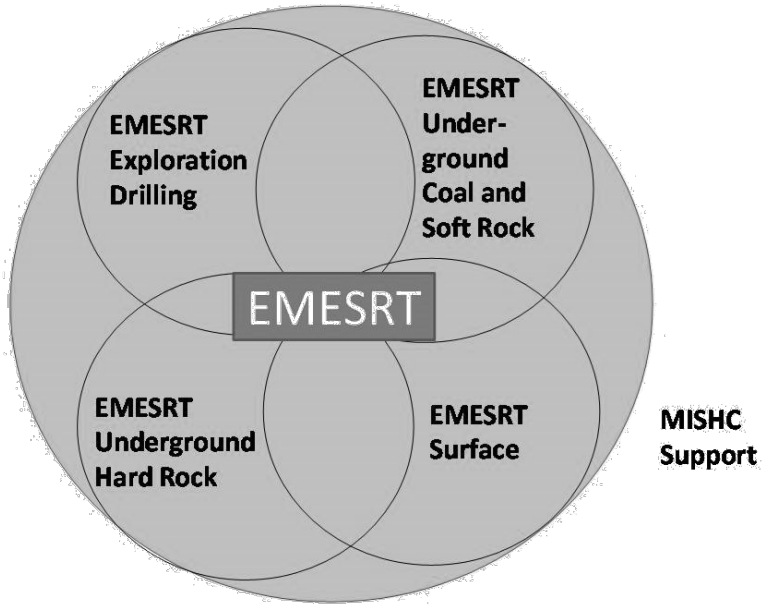
Subscribe to MIRMgate News at http://www.mirmgate.com/mirmgate_news.asp

Access TYREgate at http://www.mirmgate.com/tyregate/

EMESRT in 2009

2009 has seen an expansion of the original EMESRT scope. Four EMESRT Technical Groups have been formed to address the design issues associated with equipment used for Surface, Underground Hard Rock, Underground Coal & Soft Rock and Exploration Drilling activities.

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



MISHC continues to provide support for the EMESRT Advisory Group and Technical Group work plan activities. Services provided by MISHC include facilitation, project management, Human Factors advice, administration, communication, information dissemination and EMESRT resource development. MISHC also coordinates and provides input for the review of existing DPs, development of new DPs, facilitation of

OMAT trials, and further development and population of EMESRTgate with information resources.

EMESRT Technical Groups are undertaking steps to initiate engagement with relevant OEMs towards the end of 2009. Each group is developing resource materials to initiate the conversation with OEMs about their specific design issues, a process championed by individual members of each group.

2009 EMESRT Technical Groups

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

Building on the established relationship with surface mining equipment OEMs, the EMESRT Surface Group is currently undertaking a detailed review of the existing 15 DPs, with input sought from a range of stakeholders, including OEMs of Surface Mining Equipment.

Measures of EMESRT success

EMESRT success to date can be measured in a number of ways, although it is too soon to mark the initiative on new equipment designs.

Adoption of the EMESRT Design Philosophies by OEMs in their design process is a clear indication that the EMESRT message is hitting its target. Le Tourneau, Hitachi and Caterpillar have demonstrated their uptake of the EMESRT DPs through new equipment design concepts. Komatsu and Terex have also responded by taking part in OMAT trials.

Amendments suggested by OEMs for the review of ISO/DIS.2 2867 'Earth Moving Machinery – Access systems' appear to indicate that they are considering the EMESRT DPs in their review of standards. They have also urged EMESRT to become involved in Standards committees

In 2009, there has been a groundswell of interest in EMESRT from other stakeholders, including industry organisations such as the Surface Mining Association for Research & Technology (SMART), based in Canada, and the Atlantic Alliance, a European based group of industry organisations, whose goals for equipment design are similar to those of EMESRT.

EMESRT invited the Atlantic Alliance, SMART and The South African Chamber of Mines to address the EMESRT workshop held in Brisbane in June 2009. Each organisation congratulated EMESRT on its success to date and expressed interest in establishing a relationship with EMESRT and indicated a willingness to share information that would support the common goal of improved equipment design.

EMESRT member company representatives actively promote EMESRT at public forums such as the Queensland Mining Industry Health & Safety Conference and many other invited presentations, internationally. In September 2008, Caterpillar invited EMESRT to

participate in their HSEC Forum held in Las Vegas, in conjunction with MINExpo 2008. This opportunity was the catalyst for the relationship with SMART that has been initiated in 2009.

Regulatory bodies in Australia have recognised the value of the EMESRT resource materials by referencing them in guidance material for safe design and musculoskeletal disorders, and at seminars introducing proximity detection technology.

Similarly, OMAT is being increasingly used, with interest in the technique being shown by mine sites, OEMs and commercial software developers.

During tough economic times, EMESRT member companies have continued to commit resources that are already thinly stretched, with the view to ensuring the health and safety of the workforce now and in the future. Equipment manufacturers, despite the severe downturn in product sales, have continued to embrace the EMESRT philosophy. With the cooperation and involvement of the major equipment manufacturers, it is anticipated that equipment designs of the future will visibly demonstrate the success of the EMESRT initiative.

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